Trends in Innovation in Academic Libraries in Latin America and the Caribbean

2024 EDITION

Coordinators

José Vladimir Burgos Aguilar
Malgorzata Lisowska Navarro
Claudia Virginia Becerra Márquez

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LEGAL NOTICE

The opinions expressed herein do not reflect the official position of the participating institutions and are solely intended for educational and informational purposes.

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We also express our gratitude to EBSCO Information Services for offering us a collaborative space to exchange ideas within the framework of the Advisory Library Group LATAM. Your encouragement to undertake this report is deeply appreciated, as we are confident that it will contribute to strengthening innovation in academic libraries across Latin America and the Caribbean.

Credits

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Executive summary

This report, titled *Trends in Innovation in Academic Libraries in Latin America and the Caribbean for 2024*, examines the current state of academic libraries in the region and their alignment with global trends. It provides an analysis of educational innovation and transformation in these libraries, offering a comprehensive review of the changes over the past five years. The report aims to be a valuable resource for library leaders, supporting their institutions' evolution and transformation. Furthermore, it encourages the exchange of experiences and fosters collective learning among library professionals.

The study was conducted in four phases: a documentary analysis, a survey of 222 libraries across 22 countries, a selection of 33 exemplary practices and innovations from 19 higher education institutions (HEIs), and, finally, the formulation of strategic conclusions and recommendations.

1. **Document Review and Analysis of International Trends:** Global reports and scientific literature were systematically reviewed in databases such as Scopus and Web of Science to identify key patterns and trends in technological innovation within libraries.
2. **Survey and Data Collection:** Library leaders from the region were surveyed on issues such as the adoption of hybrid educational models, educational digitalization, and the need for accessible and flexible learning ecosystems.
3. **Analysis of Cases and Experiences:** A total of 33 innovative library cases from across the region were documented, providing best practices and lessons learned as a reference for other institutions.
4. **Development of Conclusions, Limitations, and Recommendations:** The findings led to conclusions about trends and challenges, as well as

strategies to enhance the role of academic libraries as key players in educational innovation and knowledge advancement. The study also emphasized the significance of their contribution within the broader context of higher education transformation.

The findings reveal that over 80% of higher education institutions (HEIs) have developed programs in emerging and flexible areas in response to digital education. However, only a minority of libraries actively participate in their design. Regarding learning analytics, 54% of the surveyed universities use this tool, but only 27.5% of libraries contribute to managing student success indicators. A significant 73.9% of libraries are actively involved in initiatives promoting inclusion, diversity, and interpersonal skills development programs. Furthermore, libraries are leading advocacy efforts for open science policies, though there is limited interest in negotiating transformative agreements.

Nevertheless, the use of advanced technologies such as blockchain, artificial intelligence, and extended realities remains limited. Most libraries expressed no immediate interest in implementing these technologies; however, 60.8% are involved in adopting educational innovations. Libraries also focused on optimizing budgets through consortium purchases, although more than half of the respondents reported significant budget cuts. The demands of day-to-day management reduce the time available for leaders to implement change strategies, contributing to a disconnect between the library's perceived value and its impact on institutional strategy.

The main barriers to change in academic libraries include limited financial resources (67.1%), resistance to change (46.4%), lack of skills (46.4%), and outdated professional profiles (46.4%). Lack of funding restricts the ability to implement innovations and hampers the hiring of specialized personnel. The stagnation in professional profiles limits libraries' active participation in educational innovation, and the lack of skills in technological and analytical areas hinders their ability to effectively adapt to academic needs.

To address these challenges, academic libraries are encouraged to align their value proposition with institutional strategic objectives, strengthen their role in teaching and research processes, and continue to lead open science initiatives. Transforming

traditional structures into multidisciplinary and innovative teams, as well as focusing efforts on improving academic success through targeted programs and resources, will be key strategies for increasing their impact. Additionally, it is essential to establish learning communities and spaces for sharing best practices across the region.

The report provides a clear view of trends and gaps in academic libraries across the region, guiding leaders in adapting to the rapid changes in the educational and technological landscape. In conclusion, it is proposed that this study be continued by updating the information every two years and expanding participation in subsequent editions. This effort should be accompanied by ongoing monitoring of the most significant developments and changes in academic libraries in Latin America and the Caribbean.

Introduction

Higher education institutions in Latin America and the Caribbean are facing profound transformations driven by advances in digital technologies, the growing adoption of hybrid educational models, and the evolution in the expectations of students and academics. In this context of change, university libraries have a fundamental role, since their capacity for adaptation and innovation contributes to the strengthening of teaching, learning and research within their institutions. However, despite numerous international studies on trends in academic libraries, there is a lack of specific research for our region. Faced with this need, the initiative arose to develop a project that analyzes the panorama of academic libraries in Latin America and the Caribbean, considering their cultural particularities and context.

This report aims to offer an innovative vision for academic libraries and educational institutions in Latin America and the Caribbean and address the need of a framework that allows them to anticipate emerging challenges and adapt to an ever-changing environment. With an innovative vision, the document integrates the results of an exploratory diagnosis of educational trends in the region, together with international reports and an exhaustive literature review in a technological surveillance exercise. Thus, the objective is to offer libraries in the region the necessary elements to know, anticipate and adopt best practices for the benefit of their academic communities.

The preparation of this report is a collaborative effort between information professionals from various countries in the region, including Colombia, Mexico, Chile, Argentina, Costa Rica, and Puerto Rico. This team has come together to promote collaborative learning, research, and innovation in the library field. Their goals include generating documents of regional interest, organizing professional meetings, and encouraging the exchange of good practices. These actions represent a significant commitment to improving institutional quality and supporting research. Additionally,

they aim to enhance the visibility and strengthen academic libraries and Learning and Research Resource Centers (CRAI) as leading units in generating, preserving, and disseminating knowledge and culture.

The report is structured into four chapters to comprehensively examine the state and evolution of academic libraries in Latin America and the Caribbean. **Chapter 1** delves into the international landscape of significant trends in higher education and their impact on libraries. **Chapter 2** presents the analysis and interpretation of the findings from a survey conducted among the heads of academic libraries of higher education institutions in the region. **Chapter 3** compiles a selection of case studies and representative experiences of educational innovation and transformation driven by libraries in the region. Finally, **Chapter 4** synthesizes the key conclusions, limitations, and recommendations, underscoring the libraries' involvement in a process of digital transformation, as well as the gaps and achievements in relation to global trends.

Research methodology

The report employed a mixed research approach, combining qualitative and quantitative methods to address and clarify the study's objective. Initially, a qualitative exploration of informative documentary research (Cordón-García, 2016) was conducted. This involved critical analysis of international reports and specialized literature to identify key arguments and establish a stance on the phenomenon under study. Subsequently, a deductive quantitative design was employed through the application of a survey (see instrument in Appendix No. 1) to reinforce conclusions and gather perspectives from academic library leadership. Finally, to perform the methodological triangulation, a non-probabilistic or purposive sampling method was employed, selecting relevant case studies to strengthen the validity and reliability of the results (Enrique & Barrio-Fraile, 2018).

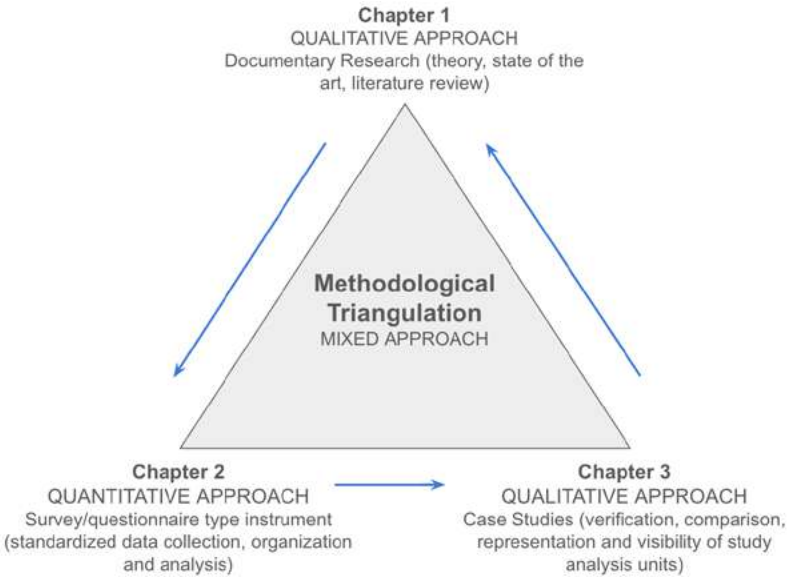


Figure No. 1. Mixed methods research (Hernández-Sampieri and Mendoza-Torres, 2023)

Chapter 1 of the report provides an overview of the topic through a rigorous process of documentary research that synthesizes, analyzes, and systematizes information concerning the trends in the transformation of higher education institutions (HEIs) and educational innovation initiatives being implemented in academic libraries. **Chapter 2** delves into the analysis of a survey conducted using a structured questionnaire-type instrument (refer to Appendix No. 1) with standardized questions incorporating controlled vocabulary, aimed at measuring the distribution of the total population across various characteristics. This design facilitated descriptive analysis by providing a comprehensive count of each question or group of questions, enabling univariate analysis that reveals the distributions of the variables surveyed.

To ensure an adequate validation process of the questionnaire and to ensure that the application of the survey produced consistent and coherent results, a two-stage validation process was designed:

- First stage: review and design of the questionnaire by directors of academic libraries with representation in the region, where suggestions and adjustments were made in the wording, clarity of the questions, measurement scales and standardization of selection criteria or categories of analysis.
- Second stage: A pilot test on the electronic platform (LimeSurvey) was carried out, with the participation of directors of academic libraries from the region, aimed to address any issues related to the instrument's configuration, validate the consistency of questions, and ensure that the survey aligned with its objectives.

Finally, in **chapter 3** of the report, a selection of case studies is presented that aim to demonstrate and highlight good practices of academic libraries in aligning with the educational trends identified in the preceding chapters.

Target population and data collection instrument

The subjects selected for this study included representatives of academic libraries, both from the public and private sector, with a diverse geographical distribution. The purpose of this selection was to capture the variety of approaches and experiences of educational and digital transformation in the region.

To obtain a comprehensive overview of academic libraries in Latin America and the Caribbean, and to generate an exploratory and documentary study of their trends in innovation, evolution or transformation, a survey comprising seven sections (see Annex No. 1) was administered to the heads of libraries and Learning and Research Resource Centers (CRAI).

To ensure greater coverage and representativeness across different countries in the region, the survey was initially designed in Spanish, with the participation of directors of academic libraries from higher education institutions who are part of the study's authorship group. Subsequently, it was translated into Portuguese and English to broaden the scope of responses.

The characterization of the representative subjects for the non-probabilistic deductive sampling includes:

- Type of institution: academic library or CRAI.
- Location: Country or region.
- Sector: public or private.

The selection criteria for the categories of analysis in the case studies were determined based on the results of tracking international trends in higher education institutions (HEIs) and information units. These criteria align with the structure of the collection instrument and encompass the following areas:

- Digital transformation and education.
- Open science (transformative agreements, open data)
- Indicators of student success.
- Student-centered (CX) and user experience (UX) approach.

- Innovation in educational spaces.
- Development of new library skills.
- Extended and immersive realities (AR, VR, XR).
- Adoption of emerging technologies (AI, applied robotics).
- Limits and scope

Scope and limitations

Given that the phenomenon studied is complex and has been little explored within the context and culture of Latin America and the Caribbean, this approach allowed for the generation of interpretative results based on the experiences and meanings given by the participants, offering a comprehensive framework of educational change in academic libraries (Hernández-Sampieri & Mendoza-Torres, 2023).

CHAPTER 1

International trends

To provide an overview of the global trends influencing academic libraries, this chapter incorporates diverse contributions from educational institutions within the publishing group. Specifically, it highlights the contributions of the following institutions:

- *At the forefront of international trends in academic libraries* (2023 edition), a report compiled by the CRAI of Universidad del Rosario in Colombia, which gathers the prevailing trends identified in various international reports, including Educause, ALA, ACRL, and the Ernst & Young Institute for the Future of Education, Zendesk, among others.[1]
- *Emerging Trends in Academic Libraries*, prepared by the Strategic Surveillance and Competitive Intelligence Unit de Universidad Nacional in Colombia, sede Medellín (See Appendix No. 4).
- *Main challenges and opportunities shown by the trends of academic libraries*, developed by Tecnológico de Monterrey in Mexico and Pontificia Universidad Católica de Chile (See Appendix No. 5).

1.1. Trends in higher education

Academic libraries play a key role in higher education institutions (HEIs) by adapting and responding to educational and scientific dynamics. To do this, they need to be informed about the trends in higher education that influence their role. This report delves into these trends and highlights how libraries can innovate and actively participate in strategic planning. Moreover, these trends served as guiding principles for designing the survey formulating the questions to define the perspective of Latin America and the Caribbean.

Among the trends, digitalization and personalized learning stand out as central pillars. Today's student-centered education adapts to individual competencies and learning styles, with an increasing use of educational technology and hybrid teaching models.

1 Available online in: https://repository.urosario.edu.co/items/c5391d8c-8009-4eb4-a122-16a32c551bcc

Institutions strive to provide more adaptable and personalized options, including online programs, micro-credentials, and interdisciplinary approaches (such as the STEAM model) (like the STEAM model) that prepare students for technological and labor market challenges.

Key factors such as the adoption of learning analytics help foster student success and retention. These tools allow HEIs to understand learning habits and improve student accompaniment. In addition, income diversification and open science become crucial, especially in the face of financial challenges and demands for greater accessibility to scientific results. Digital transformation and the development of digital skills are also essential in the face of the advance of education 4.0, which requires digital skills for effective and accessible learning.

The review of the scientific literature on emerging trends in higher education highlights a move towards personalized educational practices and the use of innovative technologies. Big data, the Internet of Things (IoT), and approaches such as the flipped classroom and hybrid education are transforming teaching to make it more flexible and adaptive. Likewise, the use of the metaverse allows for immersive and collaborative experiences, while personalized learning, content recommendation systems, and predictive analytics optimize the student experience and performance.

In terms of applied technology, blockchain ensures security in data management. Artificial intelligence (AI) and machine learning are driving personalization and performance prediction tools. Connectivity and digital infrastructure are positioned as essential elements in the integration of technologies in higher education, by facilitating a fluid connection between educational environments and new methodologies.

1.2. Trends in academic libraries

Academic libraries are immersed in an accelerated digital transformation to stay relevant in today's educational environment. This includes the adoption of emerging technologies that facilitate digital educational experiences, such as 360-degree videos and virtual reality applications. Its objective is to adapt to new educational demands, offering interactive spaces and technological resources that enrich learning.

The analysis of patents and technological records on platforms such as Patentscope and Espacenet reveals trends in innovations applied to university libraries. These patents include management systems for smart shelving, self-lending methods, data transmission, collection organization devices, and service personalization models based on big data, AI, and blockchain. Patents related to access control and security devices, such as intelligent systems to manage the flow of users in libraries, also stand out. Leading countries in patent filing in this area include China, the United States, Australia, and members of the European Union.

A transition from prioritizing physical collections to focusing on user experience (UX and CX) is observed, assessing student satisfaction and needs to improve services. The COVID-19 pandemic drove the need for libraries to adapt to changing expectations, focusing on facilitating access and creating meaningful experiences that align their services with institutional educational goals.

In addition, accessibility to digital resources has become crucial. With the expansion of internet access, users can consult information without physically going to libraries, which questions their traditional role. Likewise, libraries continue to be relevant in promoting open educational resources (OER) and access to reliable academic content online, and defending the security and veracity in the consumption of information. For the near future, libraries are looking to balance their offer between physical and digital spaces, adapting their services to the needs of students and promoting accessible and innovative learning.

In today's landscape, academic libraries are rapidly evolving to adapt to technological advances and new ways of teaching and learning. These spaces, strategically located at the heart of academic life, are being repurposed to maximize their usefulness as centers for learning and the exchange of ideas and to adapt to users' growing expectations of accessibility and personalization.

The digital transformation of libraries includes the incorporation of emerging technologies: blockchain, drones, robots, augmented reality and AI. These technologies are not only designed to optimize traditional library services, but also to create high-value, interactive educational experiences for students and scholars. For example, AI is being used to improve metadata management and facilitate machine learning, giving users a more intuitive way to interact with information.

Libraries are responding to the need to strengthen the digital skills of their users through training workshops, teaching support and access to technologies such as virtual reality, 3D printing and data analysis tools. At the same time, the library is presented as a key resource for the promotion of open science, prioritizing research data, in line with global trends in the democratization of knowledge.

One of the most notable changes is the redesign of physical spaces to be multifunctional and flexible, facilitating dynamic use that promotes collaboration, active learning, and social interaction. At the same time, libraries are increasing their focus on digital collections, displacing to some extent the physical material to create more space in response to current user demands. Remote access and diversity in digital resources, together with the possibility of adapting these resources to people with disabilities, are determining aspects that have gained relevance since the pandemic.

Recent analyses of the scientific literature show that the digital transformation in academic libraries is oriented towards the integration of advanced technologies, such as AI, considered an essential tool to optimize tasks and enhance library services. The application of this technology in process automation and data management significantly improves efficiency, allowing for better use of resources in routine tasks, research support, and more strategic library management. In addition, AI is considered to facilitate innovation in library services through business innovation, such as the Competing Values Framework (CVF) and Disruptive Innovation Theory.

On the other hand, haptic technology has been identified as an emerging resource that can make library services more inclusive and attractive for users, improving the user experience. Also, virtual reality classrooms have begun to be implemented in some libraries, where users can access immersive educational experiences, emphasizing the importance of digital literacy and the ability of libraries to adapt and provide innovative learning tools.

Research data management (RDM) is reshaping the role of libraries and their professionals. In academic institutions, the role of librarians is expanding and they require RDM competencies to collaborate in the research data lifecycle. This dynamic contributes to the consolidation of libraries as a key resource within academia, supporting the collection, storage and dissemination of scientific data.

Transformative agreements are driving a meaningful transition to open and equitable access. These agreements make it easier for knowledge to be available to a global audience without financial constraints, fostering inclusion and information sharing in the academic community.

Agile leadership approaches enable libraries to respond effectively to changes in the environment adopting strategies that foster collaboration and innovative development, while overcoming the financial and cultural challenges related to open access. This model promotes inclusion, team empowerment, and a critical management approach to foster organizational participation and engagement.

Finally, academic libraries are promoting a shift towards a multidisciplinary staff structure, emphasizing user experience, equity, and inclusion, as well as mastery in emerging technologies. This collaborative approach facilitates intergenerational dialogue and greater flexibility at work, adapting to new work and educational models that prioritize staff well-being and innovation in service to users.

1.3. Implications for academic libraries

The current academic library is presented as a laboratory of educational experiences enriched by technology, consolidating itself as a strategic resource within educational institutions. It responds to the changing needs of the academic community, assuming a leadership role and active participation in matters related to:

- Revenue diversification and budget optimization.
- Open science, with special emphasis on research data management.
- Measuring student success.
- Diverse and inclusive user experience.
- Digital transformation to improve library services and the training of digital skills, facilitating adaptation to the new needs of users and institutional demands.
- Redesign of the physical and digital spaces.
- Creation of bibliographic resources in multiple formats.
- Formation of multidisciplinary teams with agile leadership.
- Wide range of services for learning, research and extension.

It is essential to structure how international trends in higher education should influence the organization and functions of academic libraries. Elements such as the adoption of emerging technologies, learning management systems, and data availability are redefining the current model of academic libraries and CRAIs. This creates new challenges that seek to maximize access to information and foster interactive and democratic learning environments.

In addition, the need to address the new paradigms on the evolution of the library role, collection management and the integration of institutional objectives in the activities of the information units is evident. This requires libraries to increasingly become spaces that manage innovation, research and the dissemination of knowledge, and to go beyond their historical role as stewards of information.

CHAPTER 2

Diagnostic survey

The following is the analysis of the survey conducted to validate or confirm the trends identified in Chapter 1.

2.1. Survey implementation

The survey was applied virtually in 22 countries in the region between June 14 and July 15, 2024. The study is based on a representative sample of a larger universe of data from 7129 higher education institutions in the 22 countries included in the study, which can be seen in Annex No. 2.

According to the sample size, a confidence level of 95%, a margin of error of 7%, and an ideal sample size of 191 valid responses were achieved (Table No. 1).

METHODOLOGICAL OVERVIEW	
Instrument	Survey
Administration	Online using LimeSurvey
Measurement	Likert scale
Timeframe	June 14 to July 15, 2024
Scope	22 countries in Latin America and the Caribbean
Population	Academic Library Directors / Heads / Coordinators
Reliability	95 %
Margin of error	7 %
Participation	Total population: 7129 Surveys sent: 564 Minimum sample size for validity: 191 Total responses received: 254 **Valid responses: 222**

Table No. 1. Survey technical sheet

The questionnaire, initially designed in Spanish, was subsequently translated into Portuguese and English. It comprises 33 questions, divided into seven distinct sections.

Section 1: Demographic profile and context.
Section 2: Organizational profile, structure and autonomy of the Library/CRAI.
Section 3: Characteristics of the HEI (academic environment in Latam).
Section 4: Analysis of trends in academic libraries.
Section 5: Personnel: multidisciplinary teams and new skills.
Section 6: Impact of the library on the Institution of Higher Education.
Section 7: Conclusions.

Distribution of Responses and Validation Process

The survey was sent to 564 executives in 22 countries in Latin America and the Caribbean, obtaining 254 responses. The distribution of responses by country is presented in Graph No. 1, observing the direct relationship between the size of the circle and the number of responses received:

Figure No. 2. Distribution of Responses Received by Participating Countries

To ensure the quality of the responses, the following verification criteria were applied:

- Complete answers: including all necessary data, such as the identification of directors and HEIs.
- Unique answers: from each HEI, prioritizing the answers of the head of the Library (Library System Director, Library Director, University Librarian or Director of CRAI). In case of multiple responses from the same institution, the one sent by the highest authority was selected.
- Autonomous libraries: only responses from libraries with independent or autonomous administrative and budgetary headquarters were considered.
- Type of library: Responses from CRAI, academic or research libraries were accepted.

Once the selection and validation criteria were applied, it was necessary to discard 32 surveys. Thus, the final sample of the surveys to be processed was 222, exceeding the minimum established sample of 191 responses, which ratifies the validity, reliability and consistency of the research.

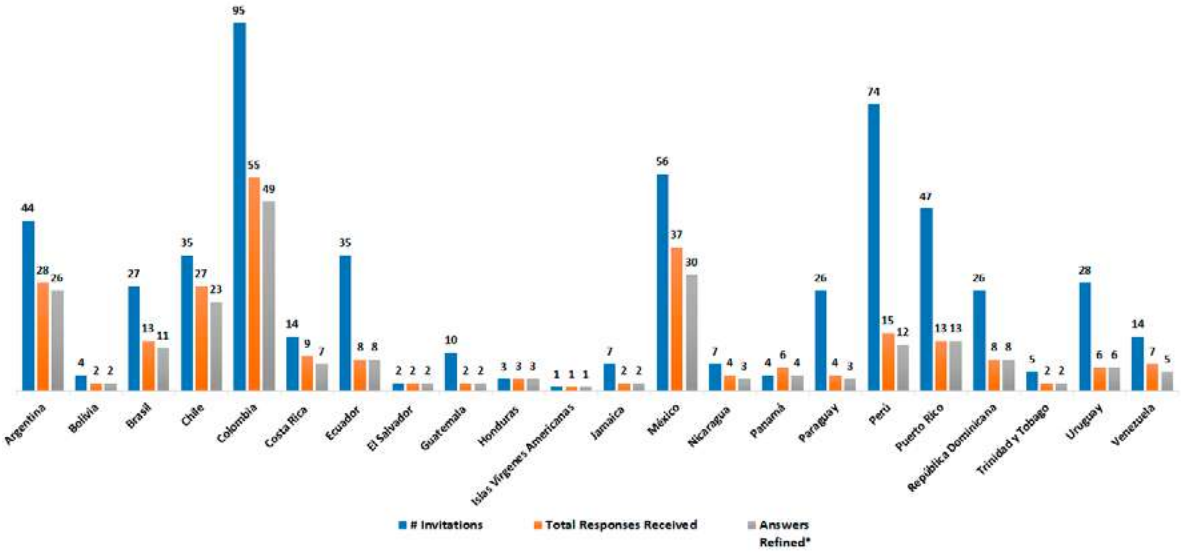


Figure No. 3. Country distribution of invitations, responses received, and filtered

The low participation of Brazilian institutions is striking, given its regional importance, and it is hoped that this situation will be reversed in the next edition of this report.

For the tabulation and analysis of the data collected in the survey, the Power BI tool was used. Specific dashboards were developed for each section of the survey with the intention of cross-referencing the data between various variables, facilitating a deeper and more detailed analysis. In this way, patterns, trends and relationships between different variables can be visualized, allowing the interpretation of the results and the extraction of significant conclusions.

To ensure its preservation and facilitate future analysis or research, the data were processed and anonymized to protect the privacy of the participants. This approach ensures that the data analysis is accurate and accessible and that information is managed ethically and professionally..

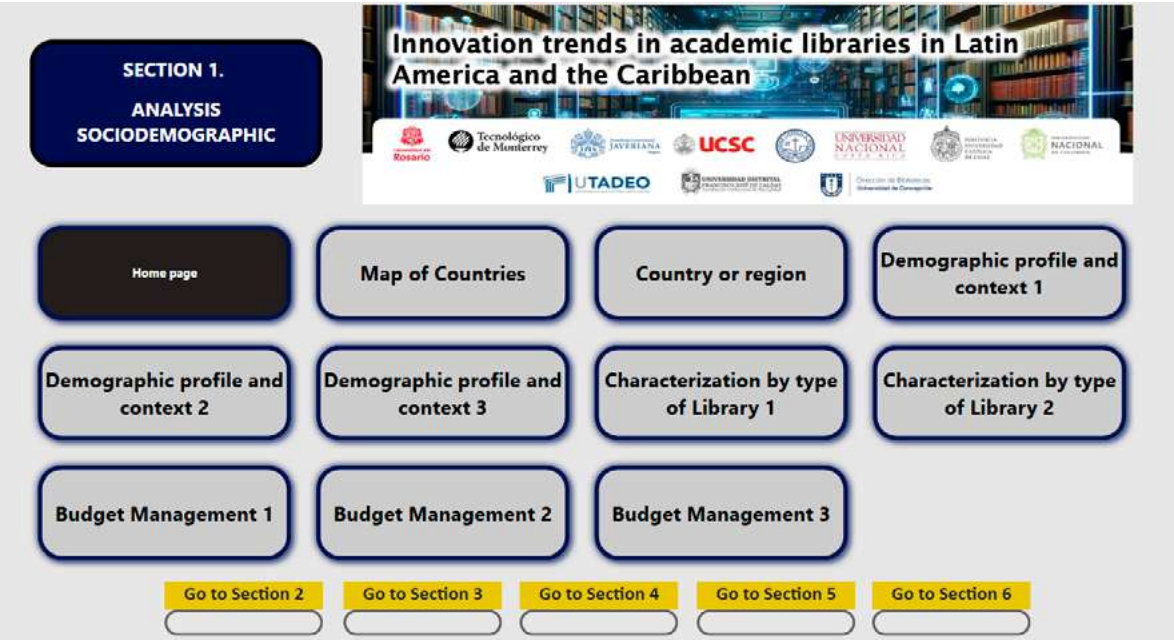


Figure No. 4. Visualization of research data in the Power BI Dashboard

2.2. Analysis and results

SECTION 1: Demographic profile and context

According to the responses received, 87.84% of the units of information surveyed corresponded to academic libraries. Based on these results, it can be concluded that the traditional vision of the library prevails in the region, since only the remaining 12.6% have adopted the name CRAI (Figure No. 4).

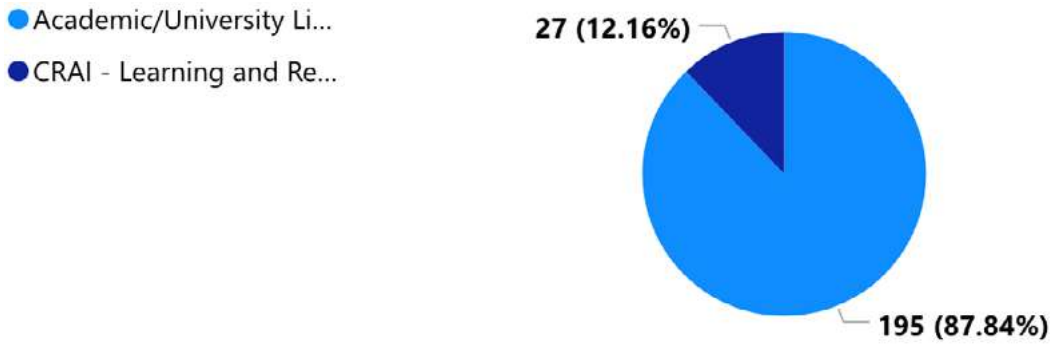


Figure No. 5. Types of information units participating in the study

The survey was answered mainly in Spanish (92.79%), then in Portuguese (4.95%) and finally, in English (2.26%).

Leadership profile

Most of the responses were received from the directors of library systems/CRAI (47.3 %) and the directors of campuses or headquarters (22.97 %), adding up to 70.27 % of the responses between the two profiles. The remaining percentage corresponds to leaders (12.61%) or library managers (17.12%).

This distribution of responses provides a detailed overview of the hierarchical level and representativeness of the survey participants, highlighting that most responses come from the heads of information centers in libraries.

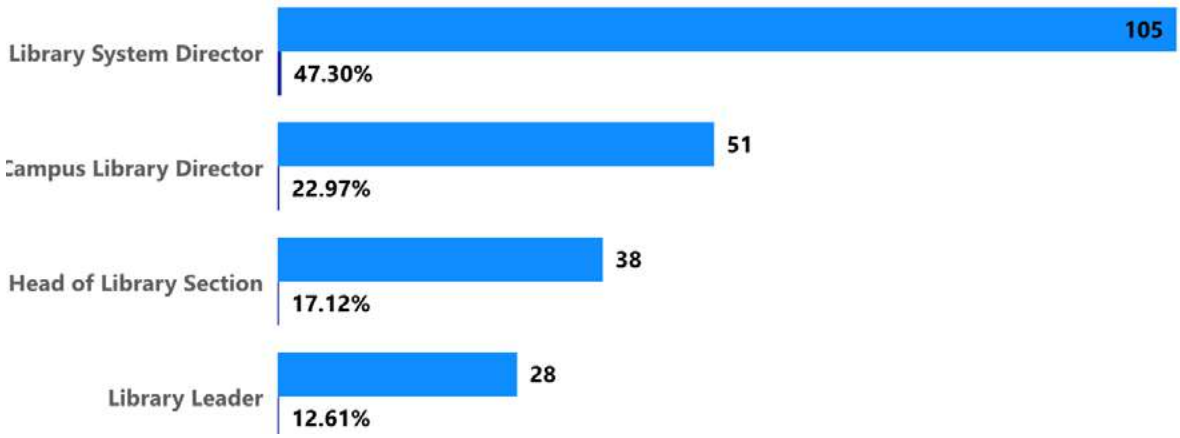


Figure No. 6. Position currently held

In the sample, women are more likely to hold management positions, comprising 66.22% of the workforce compared to 33.78% of men. Additionally, 72.97% of the respondents were over the age of 46, while only 6.76% were under 35 years old. (Figures 7 and 8).

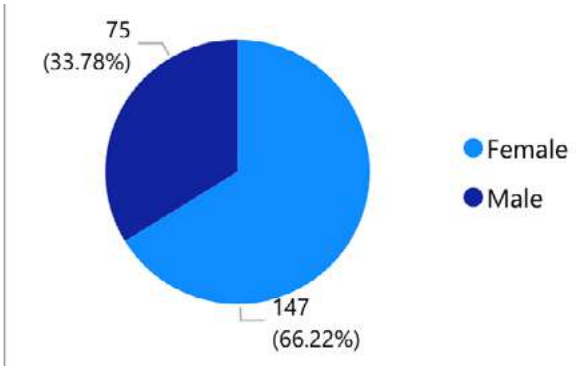


Figure No. 7. Gender distribution

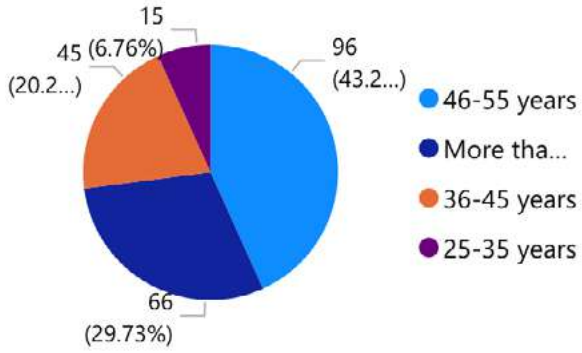


Figure No. 8. Age of the respondents

Women have a predominant presence in the positions analyzed. Among them, 34.69% reported having more than 15 years of experience in managerial roles, compared to 22.67% of men (Figures No. 8 and 9). The experience of male respondents was primarily concentrated in the 6-to-10-year range (28%).

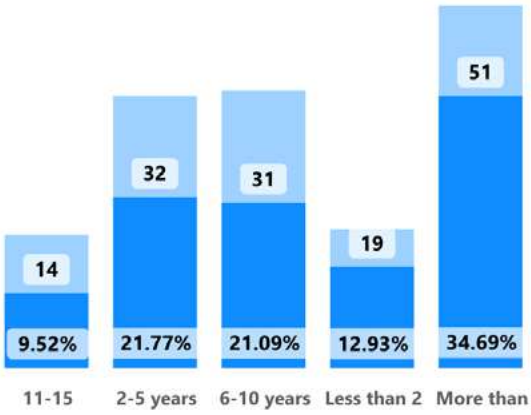


Figure No. 9. Years in position (Women)

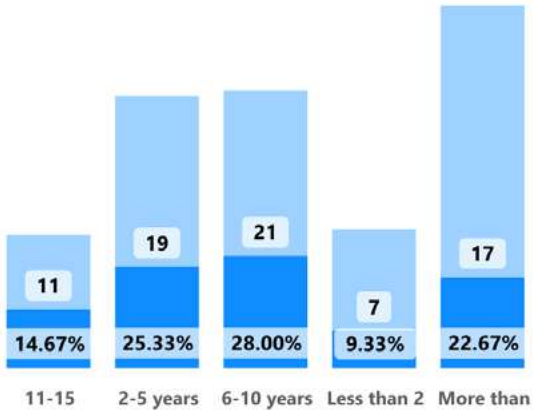


Figure No. 10. Years in position (Men)

Mostly (72.97%), the libraries are run by people over 46 years of age with extensive experience of more than 10 years in the position. Although, for now, management positions are mostly occupied by women, this trend is changing little by little, given that currently 33.78% of men run libraries.

In terms of training, the highest level achieved was the master's degree (45.05%), followed by the bachelor's degree (42.34%); only 8.56% of the sample had a doctorate.

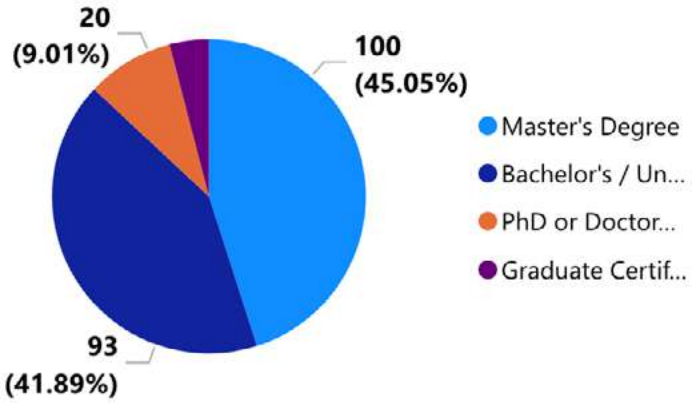


Figure No. 11. Highest level of education attained

Regarding academic education related to library science, 60.36% of respondents reported having it; of these, 50.75% hold a bachelor's degree, 42.54% have a master's degree and only 6.72% possess a doctoral degree.

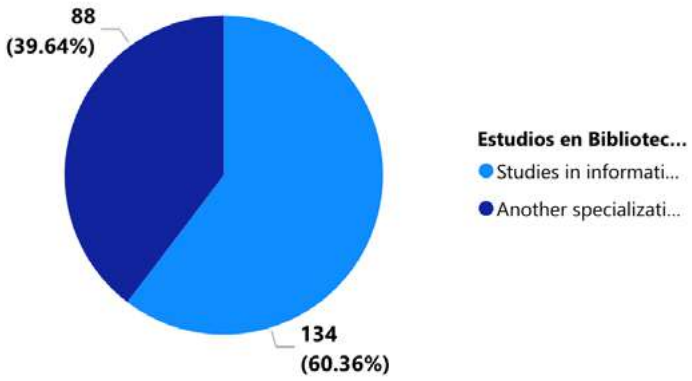


Figure No. 12. Academic education

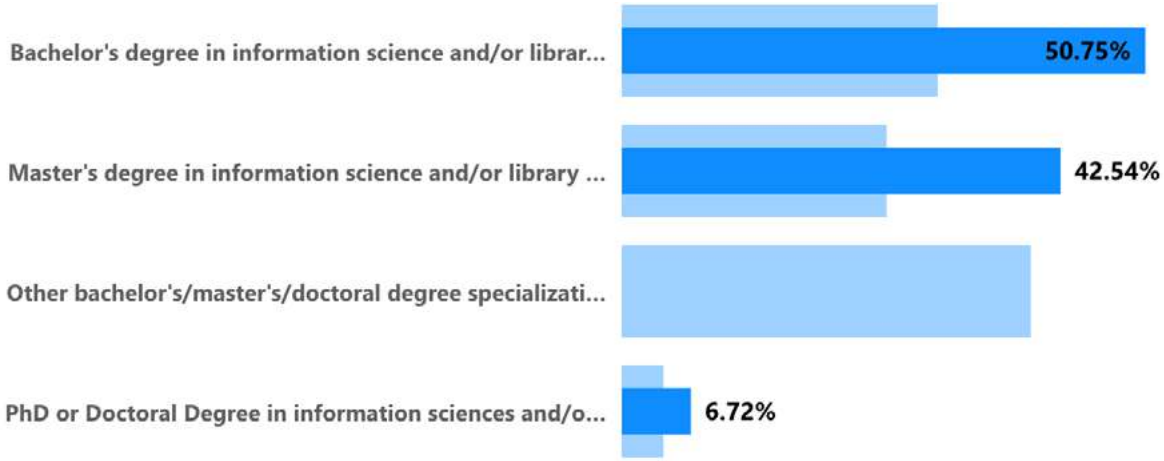


Figure No.13. Academic education in Library Science and related fields

The fields of study other than library and information sciences are very diverse. They are mainly related to education management, humanities, law, ICT and administration.

Figure No. 14. Other areas of education

SECTION 2: Organizational profile, structure, and autonomy

Of the 222 institutions that participated in the survey, 53.15% belonged to the private sector and 46.85% to the public sector.

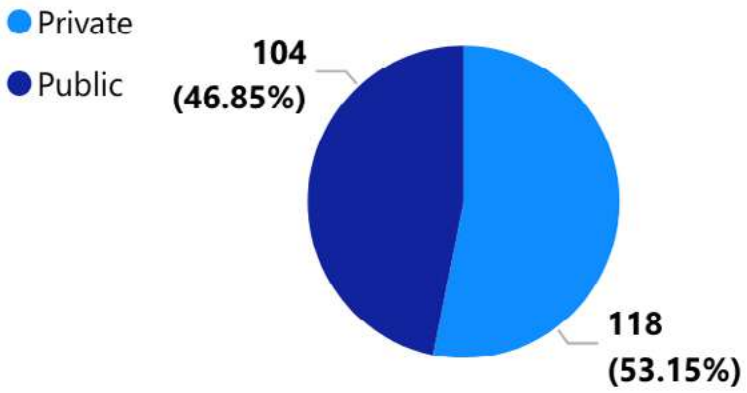


Figure No. 15. Sector of HEIs

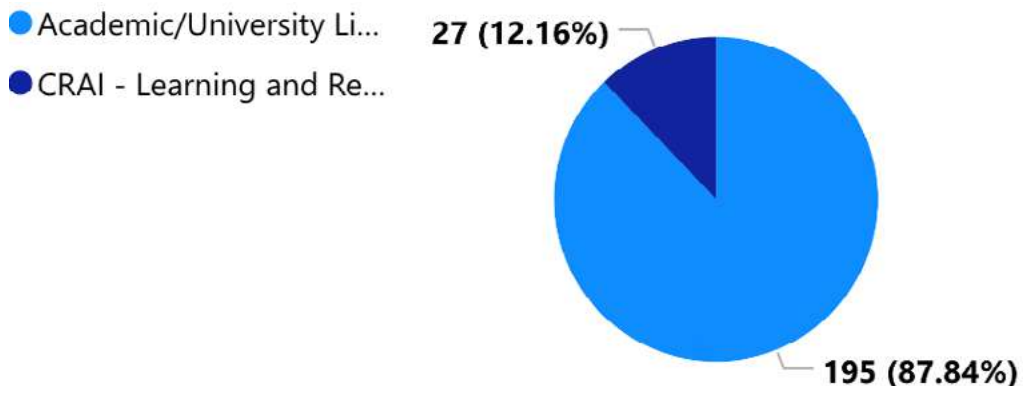


Figure No. 16. Type of information unit

As for organizational dependency, the majority (62.16%) are part of the vice-rectories or directorates of academic affairs.

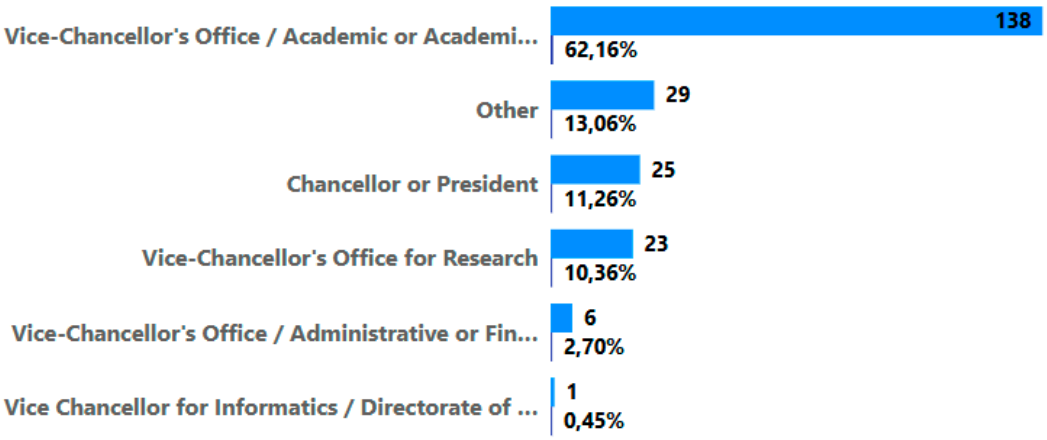


Figure No. 17. Organizational dependence

Most libraries were small, since 58.56% had fewer than 20 contributors and only 11.71% had more than 71 (Figure No. 17). The public sector accounts for 85% of the large libraries, with more than 71 collaborators, while in the private sector, 70% of libraries have fewer than 20 collaborators (Figure No. 18).

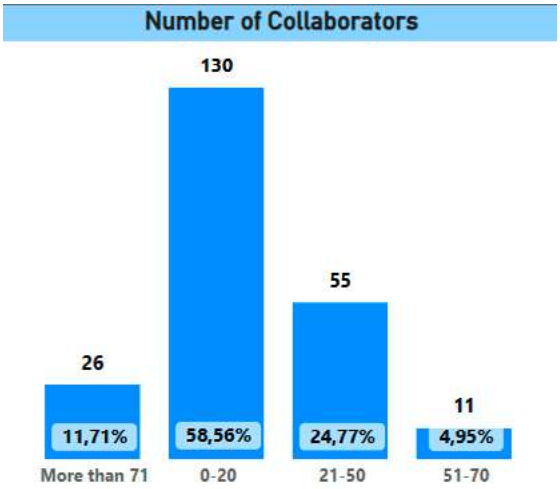


Figure No. 18. Size of the libraries

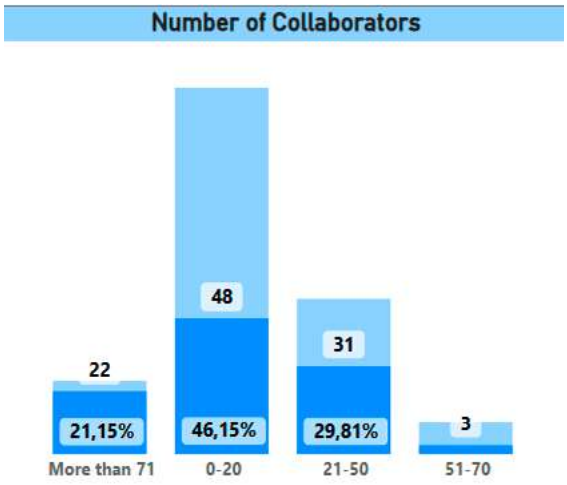


Figure No. 19. Size of libraries in the public sector

Regarding the human resources that make up the staff of the libraries, the study has considered the inclusion of two variables: the first, related to the education of the staff, specifically referring to education in library science; and the second, concerning unionized personnel.

In the first case, 34.68% of institutions reported that the percentage of staff with an education in library science is less than 15%, while another 31.98% stated that this percentage is greater than 46%.

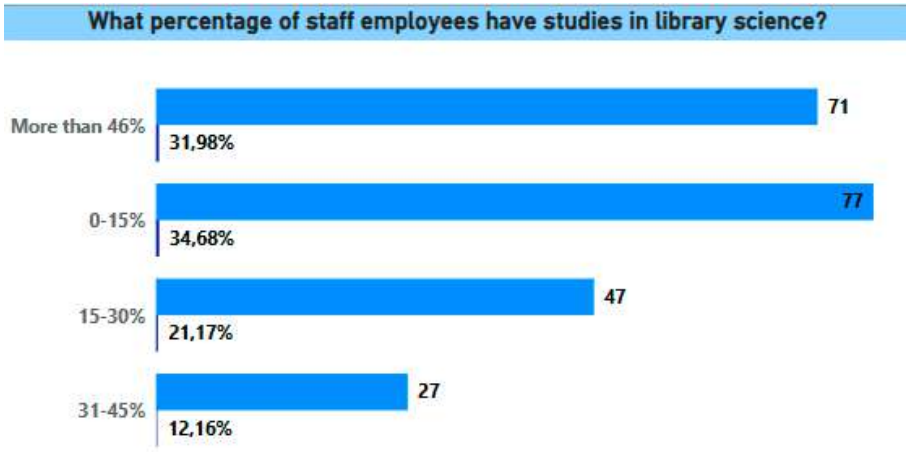


Figure No. 20. Percentage of Staff with Education in Library Science

Regarding the second aspect, 55.86% of the institutions have unionized staff, and in 32.88% of the institutions, the percentage of staff participation in the union exceeds 50% of the workforce.

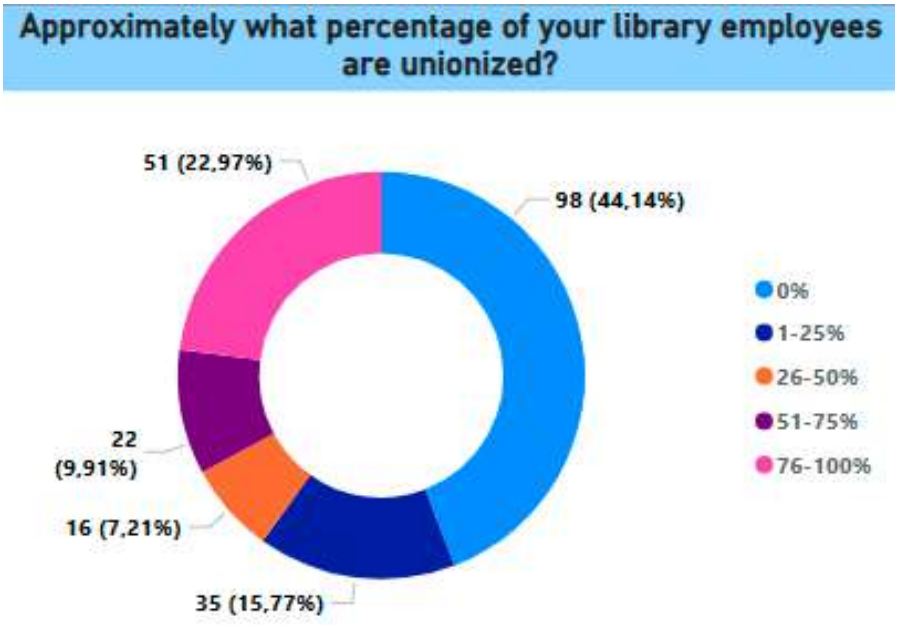


Figure No. 21. Union participation

This percentage increases in the public sector, where 93.69% of institutions have unionized staff, compared to the private sector, where this percentage is 62.16%.

Budget Management

In 58.56% of institutions, the previously allocated budget is managed by the director, who has autonomy in its execution; in 24.32% of cases, the director is not autonomous; and in 14.41%, the director always needs to request authorization. This same trend holds true regardless of whether the institution is public or private.

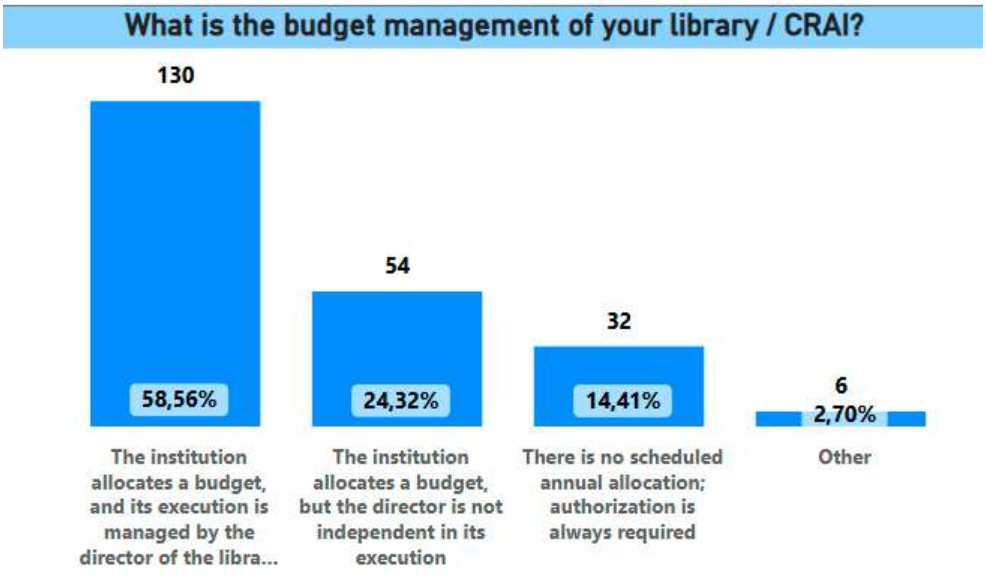


Figure No. 22. Budget autonomy

The 44.59% of institutions report no budget cuts recently. This percentage is notably higher in private libraries, where more than half of the surveyed institutions (52.54%) have not faced reductions. The remaining 55.41% have experienced significant cuts, with 21.62% of cases seeing reductions greater than 31%.

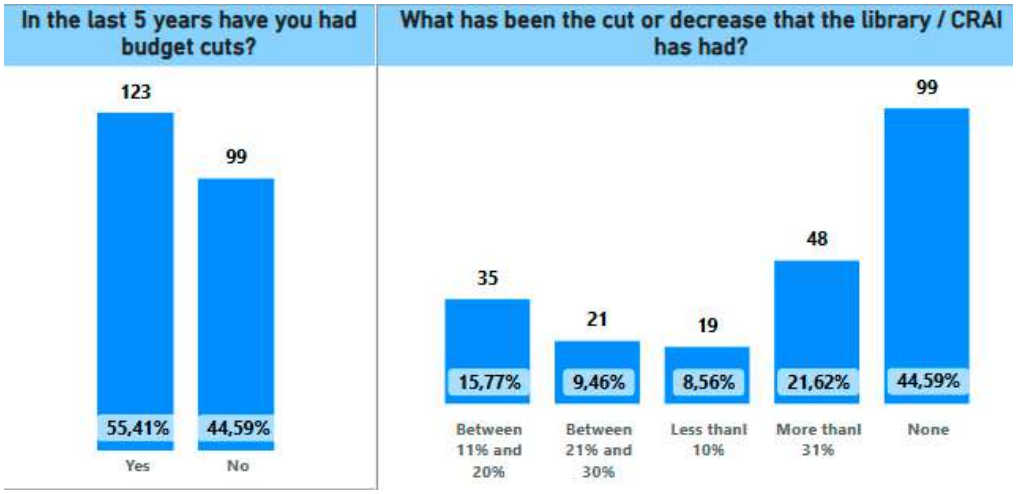


Figure No. 23. Budget cuts

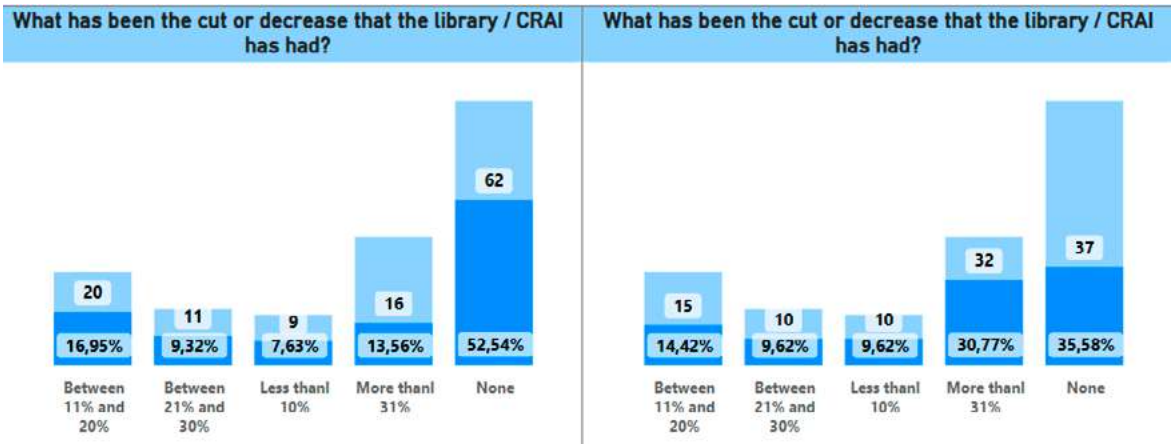


Figure No. 24. Budget cuts: Private sector vs. Public sector

The items most affected by the cuts were the following:

- Printed collections: 72.36 %
- Staff: 58.54 %
- Digital collections: 58.54 %
- Infrastructure and technology: 49.59%
- Operating Expenses: 43.09%

Libraries report that management and operation tasks take up most of their time, making it difficult for them to devote enough time to implementing change strategies. Figure No. 24 shows in more detail what their priorities are.

QUESTIONS	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	Priority 7	Priority 8	Weighted Average
Manage the budget for library collection development	16.2%	13.5%	5.9%	6.8%	5.4%	8.1%	9.0%	7.2%	46%
Design and facilitate training programs in information management	15.3%	12.6%	8.6%	9.9%	11.3%	9.5%	7.2%	5.0%	51%
Develop strategies and ensure academic engagement	14.4%	6.3%	8.6%	8.1%	7.2%	5.0%	7.7%	7.7%	40%
Manage the budget for technologies and enablers for library services	12.6%	8.6%	9.5%	6.3%	6.8%	5.9%	8.1%	9.0%	40%
Manage educational spaces for learning, study and collaboration	10.4%	5.9%	9.0%	9.5%	7.7%	9.5%	10.4%	8.1%	39%
Collection Management	8.1%	7.2%	7.7%	6.3%	6.8%	6.8%	5.9%	7.7%	32%
Quality and experience evaluation processes to ensure certifications, accreditations or guidelines	5.4%	6.8%	13.5%	8.6%	6.8%	9.9%	7.7%	6.8%	37%
Design and facilitate training programs for the development of research skills	4.5%	10.8%	12.6%	10.4%	8.1%	9.0%	5.0%	5.9%	39%
Other academic activities that are not directly related to the library / CRAI	3.2%	4.6%	0.5%	3.6%	6.8%	6.8%	5.9%	4.5%	18%
Cataloging, standardization	3.2%	4.1%	5.9%	9.5%	9.0%	5.4%	7.2%	8.6%	26%
Management and/or administration of the institutional repository	2.3%	5.0%	7.2%	6.3%	8.1%	10.4%	7.7%	7.2%	27%
Development of special collections	1.8%	4.5%	4.5%	4.1%	5.0%	4.5%	5.4%	5.9%	18%
Training and provision of specialized librarians	1.8%	3.2%	4.1%	4.5%	7.2%	4.5%	7.7%	9.5%	19%
Management and/or administration of academic journals	0.9%	5.0%	1.8%	5.4%	3.6%	5.0%	5.4%	7.2%	16%

Figure No. 25. Library occupancy and prioritization

(**Note:** The shades of green represent the longest time allocated for the work, while the shades towards red represent less time spent on the aforementioned functions)

SECTION 3: Characteristics of higher education institutions (academic environment in LATAM)

In the last five years, 81.5% of HEIs have created programs in new areas of knowledge or interdisciplinary programs; of these, 58.1% have obtained proven results and 23.4% have not yet obtained results. Only 6.3% of institutions have not done so.

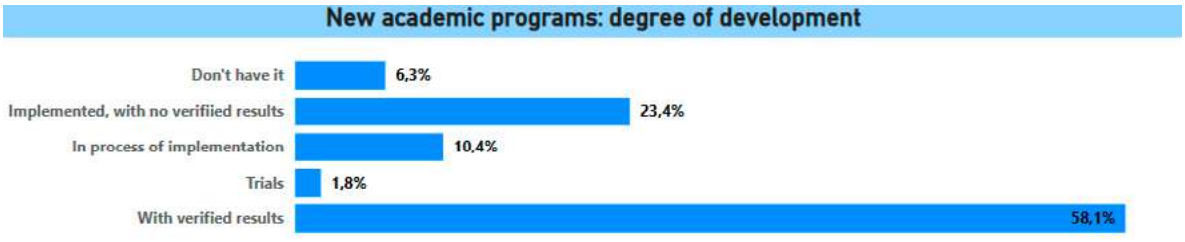


Figure No. 26. New academic programs and their adoption level

Likewise, 81.1% of HEIs have made their programs more flexible to respond to the new demands of digital education (online, virtual, HyFlex/hybrid or mixed programs); of these, 63.5% have proven results and 17.6% have not. Only 3.6% of the institutions stated that they had not done so.

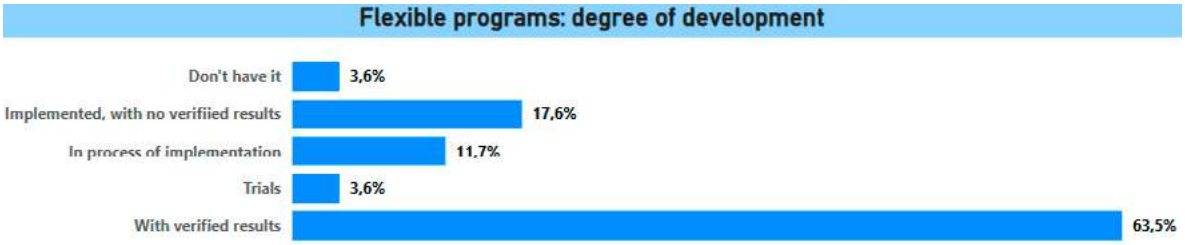


Figure No. 27. Flexibility of programs and their level of adoption

It is recognized that open science is an important trend for HEIs, and it is identified that 36.1% of them state that they have some initiative, such as policies, models, guidelines or strategies; 23% have proven results and 13.1% have not yet obtained results. On the other hand, 24.3% of the institutions have not made progress on this issue.

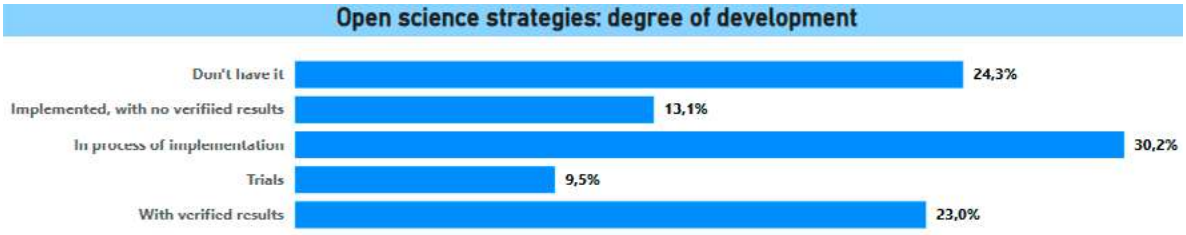


Figure No. 28. Level of Open Science Adoption

Learning analytics and student success is a trend that has been present in trend reports for several years. However, it has recently established itself as a fundamental strategy to support students' academic success. Figure No. 28 shows that 54% of the institutions surveyed have taken actions in this regard, of which 37.8% have obtained proven results and 16.2% have not yet obtained results. On the other hand, 20.7% of the institutions have not taken any action in this regard.

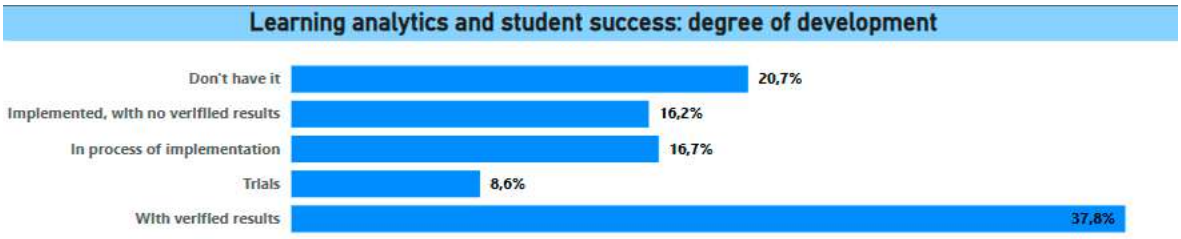


Figure No. 29. Learning analytics and adoption

Inclusive and equitable education is a trend that seeks to respond to the diversity of students and increase the participation of different groups in university life. As can be seen in Figure No. 29, a positive effort has been made to develop programs that favor inclusion and diversity, although less than 10% have not yet carried out actions around this issue.

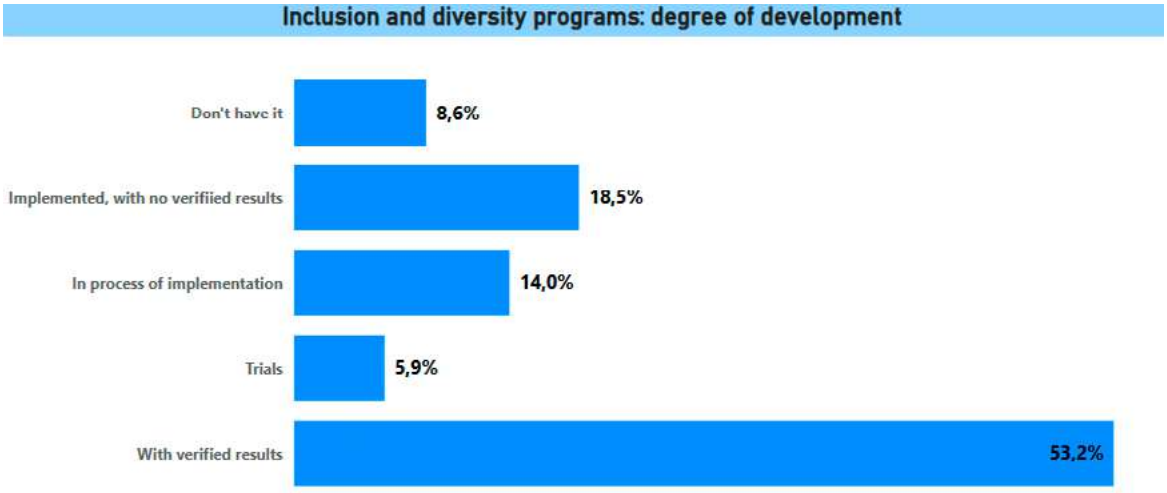


Figure No. 30. Inclusion and diversity programs in education

Recognizing the importance of aligning academic libraries with the educational model, it is important to examine the extent of their participation in institutional initiatives. Figures 30 and 31 reveal that 43.7% of libraries actively contribute to the design or creation of new academic programs, while 38.8% collaborate in developing flexible and virtual programs that cater to the demands of digital education. However, it is worth noting that the percentage of libraries not participating in these processes exceeded 30% in both cases.

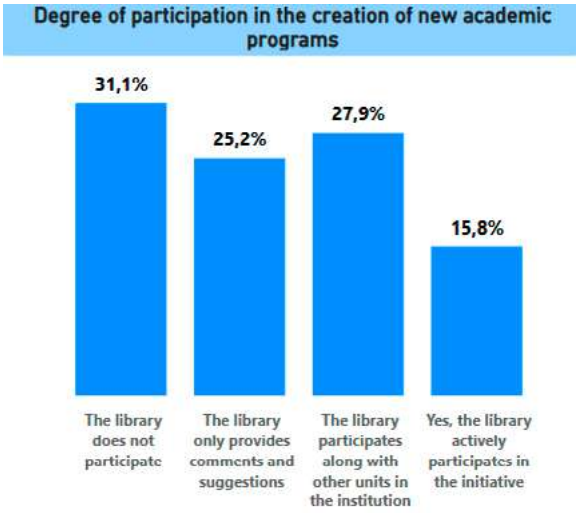


Figure No. 31. Library's participation in the creation of new academic programs

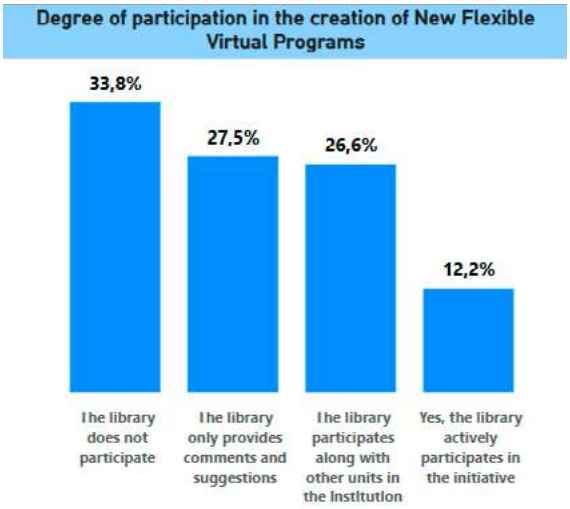


Figure No. 32. Library's Participation in the Creation of Flexible Programs

Regarding the level of leadership that libraries exhibit in promoting open science, it's evident that a substantial 55.4% of libraries actively participate in defining policies, models, guidelines, or institutional open science strategies.

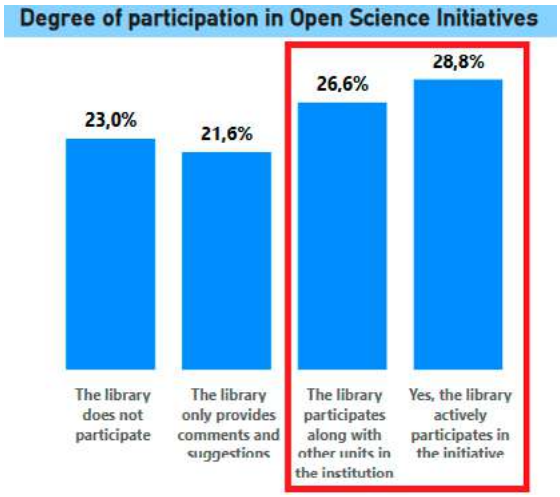


Figure No. 33. Library's level of involvement in promoting open science

Through the study, it can be identified that one of the main trends in higher education is the concern of HEIs to create programs to strengthen student success and learning analytics to evidence it. In the first case, that of the library's participation in the creation of programs that support student permanence, it can be seen that 34.2% do so actively. In the second case, participation in the definition of actions or initiatives to provide dashboards of indicators or statistics that make student success visible, 27.5% of libraries do so actively. In both cases, it is evident that more than 40% of libraries declare that they have no participation in the creation of programs or the generation of dashboards of student success indicators.

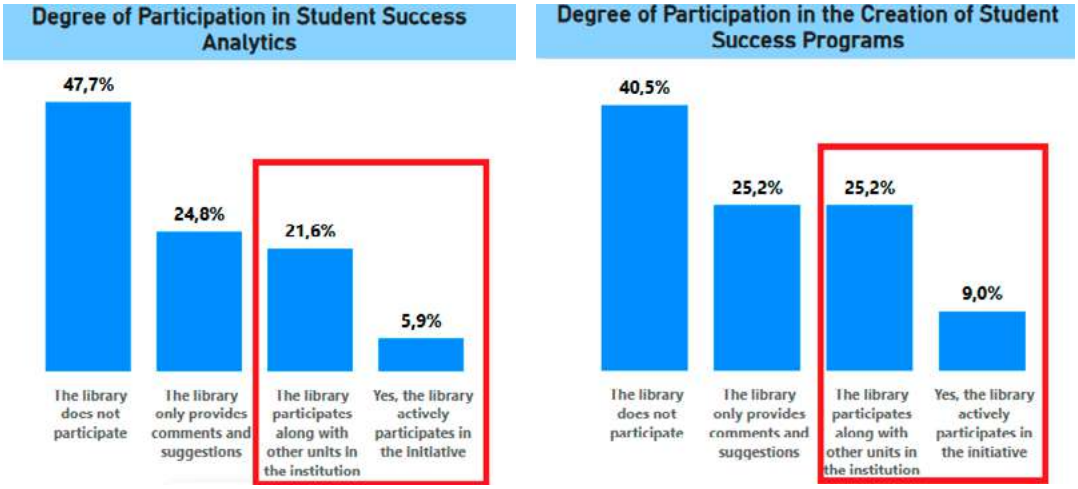


Figure No. 34. Library's level of involvement in student success programs and indicators

The report identifies that academic libraries play a very important role in educational inclusion actions by providing access to information, with the aim of promoting equal opportunities and serving as a knowledge management center for the HEI, providing a space that encourages equity and diversity. Figure No. 34 identifies that 73.9% of libraries have a degree of participation in the generation of initiatives or experiences of inclusion and diversity.

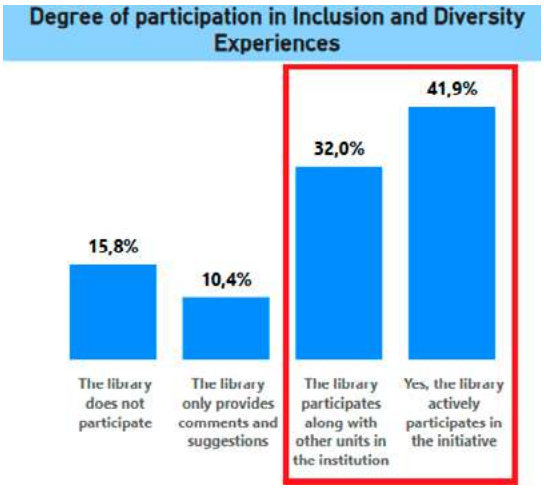


Figure No. 35. Library's involvement in inclusion and diversity experiences

Regarding the search for initiatives that allow libraries to diversify their income and help reduce HEI spending, Figure No. 35 shows that only 25.6% of libraries actively do so and most do not (45.5%).

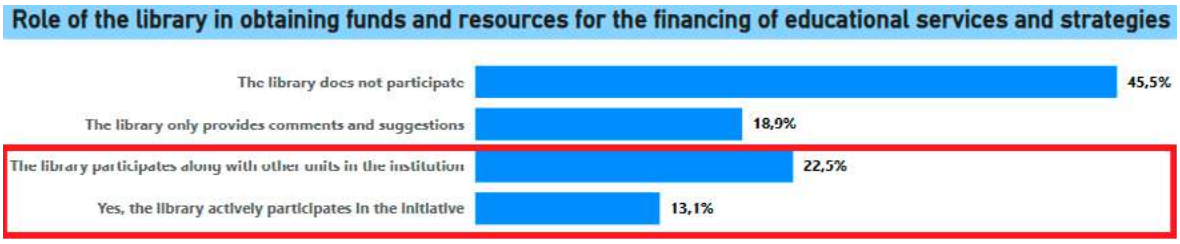


Figure No. 36. Role of the library in the diversification of income sources in higher education institutions

The academic library plays an important role in the exploration and discovery of the potential role of technologies in the teaching-learning processes, offering spaces to show, train or raise awareness in the academic community in the use of new technologies. In this sense, Figure No. 36 shows that 60.8% of libraries participate in the process of adopting educational innovations and 28.4% have no participation in the generation of this type of initiative.

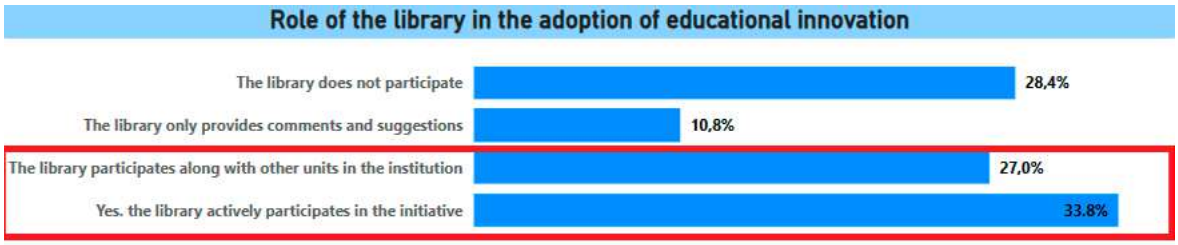


Figure No. 37. Adoption of educational innovation in the library

In the results of the report, it can be observed that 73.9% of the libraries surveyed actively participate or collaborate with other areas, facilitating the adoption of educational spaces (infrastructure) or programs that help develop interpersonal skills or personal development (inclusion, equity, leadership, time management, reading or study techniques).

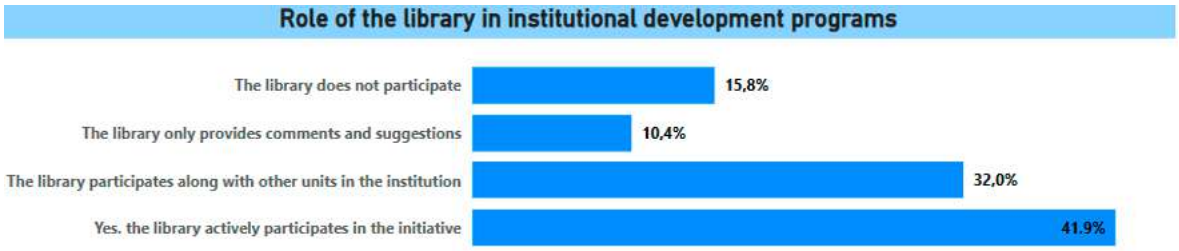


Figure No. 38. The role of the library in institutional development programs

SECTION 4: Analysis of academic library trends

This section is directly related to international trends in academic libraries/CRAI. Its objective is to understand the development of different aspects and their degree of maturity in the surveyed libraries. Specifically, about experiences, services, inclusive and diverse spaces; digital skills training programmes; impact indicators; income diversification programs; participation in consortia; institutional research data management (RDM) strategy; open educational resources (OER); negotiation of transformative agreements and user experience. In this sense, libraries have been asked about the degree of maturity of the implementation on a scale between “I don’t have it planned in the short term” and “Yes, I have the experience implemented”.

Regarding inclusion and diversity programs, it is evident that 64.8% of the institutions are in the process or have already implemented this type of initiative, while 19.8% say they do not plan to develop them in the short term.

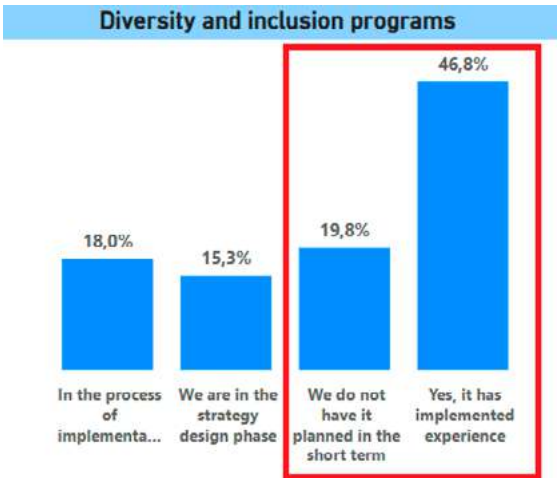


Figure 39. Level of maturity in the implementation of inclusion strategies

The impact of libraries on the educational experience is an important issue; 65.3% of the institutions state that they have implemented or are in the process of implementing related initiatives. For their part, 20.3% of libraries have not planned to implement them in the short term.

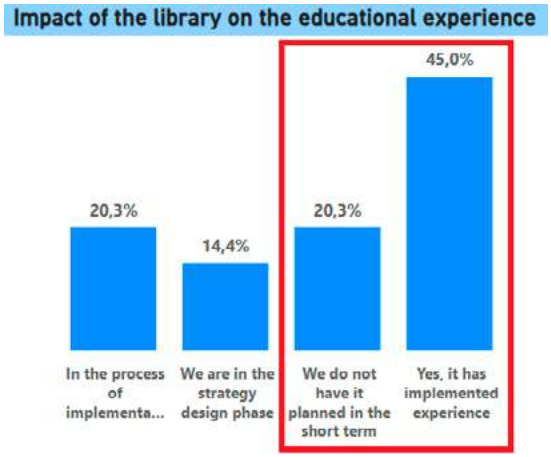


Figure 40. Development level of library impact strategies on the educational experience

In relation to income diversification, only 11.3% of institutions have programs implemented for the sale of products or services, while 7.2% are in the process of implementation and 12.6% are in the strategy design phase. The majority (68.9%) do not plan to implement these initiatives in the short term.

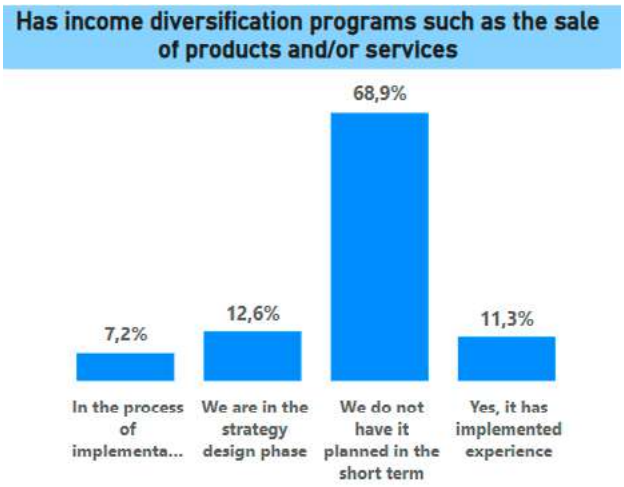


Figure No. 41. Strategies for revenue diversification

The optimization of the budget for investment in bibliographic material, thanks to participation in consortia, is another important issue that helps to improve the financial situation of institutions. In this sense, more than half of the libraries (53.6%) have already implemented experiences and 3.6% are in the process of implementation. However, 32.4% of institutions have no short term plans to join this type of initiative.

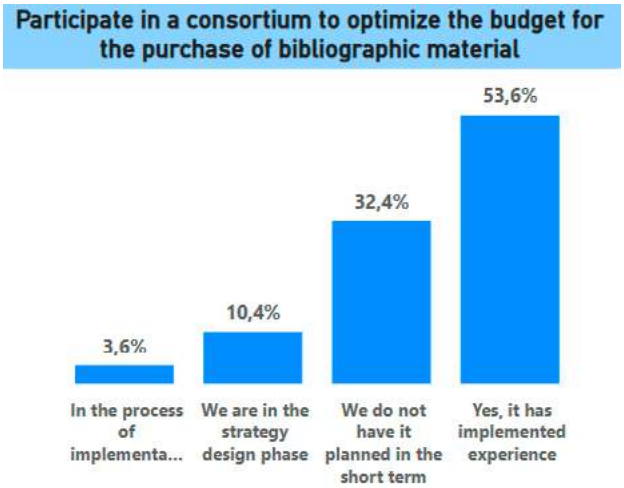


Figure No. 42. Participation in consortia to optimize budgets

Open Science is a key trend in higher education institutions, gaining momentum year after year. In this context, libraries must play a central role in strategies related to research data management (RDM), Open Educational Resources (OER), and the negotiation of transformative agreements, including 'Read & Publish' agreements, aimed at generating benefits related to article processing charges (APC).

Regarding research data management, 41.9% of institutions have already implemented or are implementing these strategies, while the remaining 58.1% are just designing them or do not plan to implement them in the short term.

Regarding OER, 43.7% of the institutions have already implemented or are implementing these strategies. For their part, 56.3% of libraries are barely designing them or do not plan to implement them in the short term.

Finally, when it comes to negotiating transformative agreements, such as Read & Publish benefits or APCs, only 14% of institutions have managed to implement them, 6.8% are in the process and 65.3% do not plan to negotiate this type of agreement in the short term.

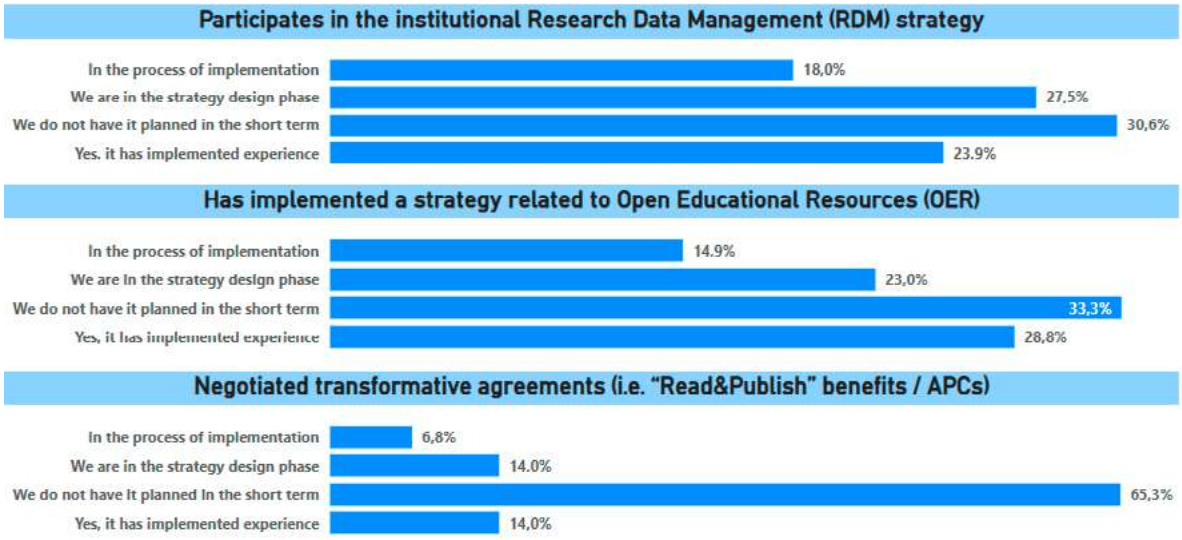


Figure No. 43. Level of library participation in the adoption of open science

The emphasis on user experience personalization (UX-CX) in library services is very important for HEIs, as it contributes positively to increasing retention and reducing dropout, thus improving academic success. In this sense, 42.4% of libraries have

integrated these strategies or are in the process of implementation, while 37.8% of institutions do not plan to adopt them in the short term.

Figure No. 44. Level of adoption of user experience strategies

The new approaches in cataloging bibliographic resources and the replacement of the current MARC 21 cataloging scheme are an urgent need, as expressed in the trend reports. However, as shown in Figure No. 44, 42.3% of libraries do not plan to implement them in the short term.

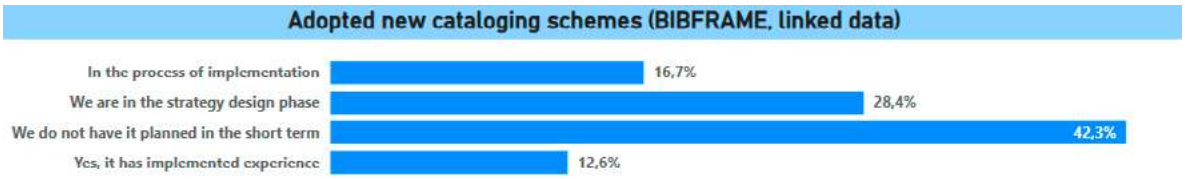
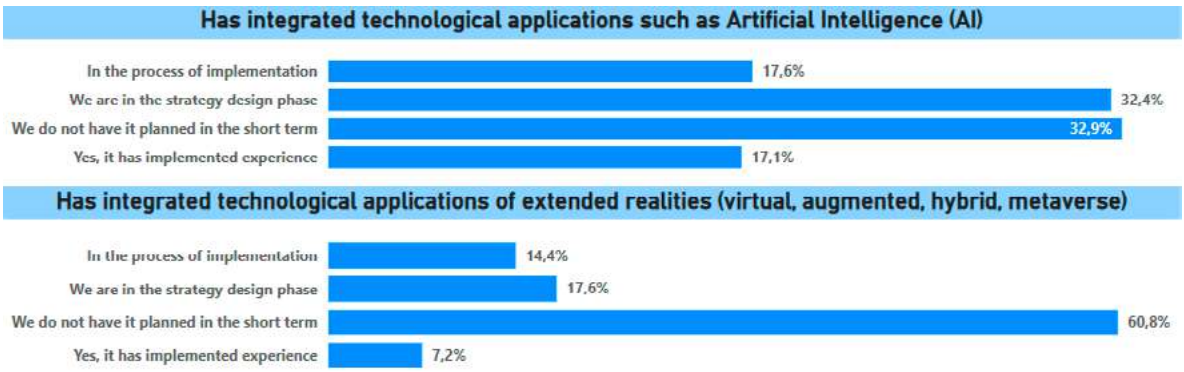


Figure No. 45. Level of adoption of new cataloging formats

Finally, aspects related to technological applications, such as the use of block-chain, AI, extended realities (virtual, augmented, hybrid, metaverse) or robotics (drones, robots), seem to be still a long way from the region's libraries. In all cases, having no interest in implementing them in the short term represents a fairly high percentage.



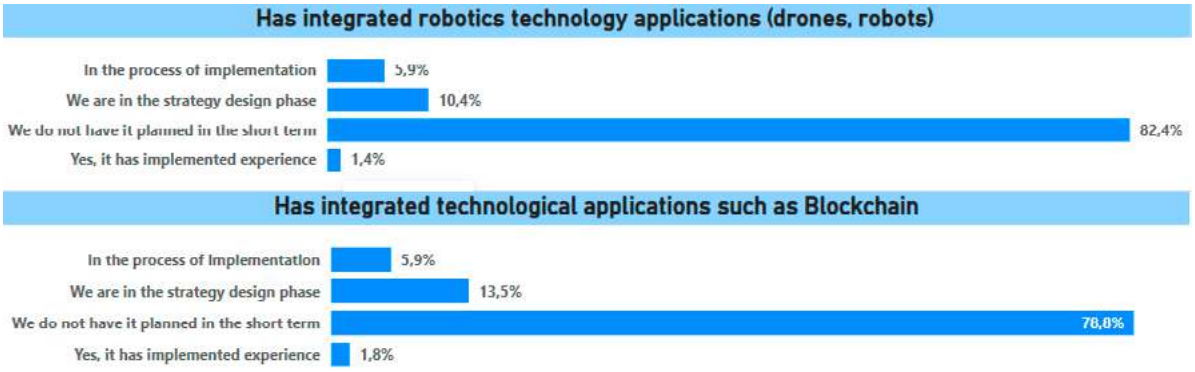


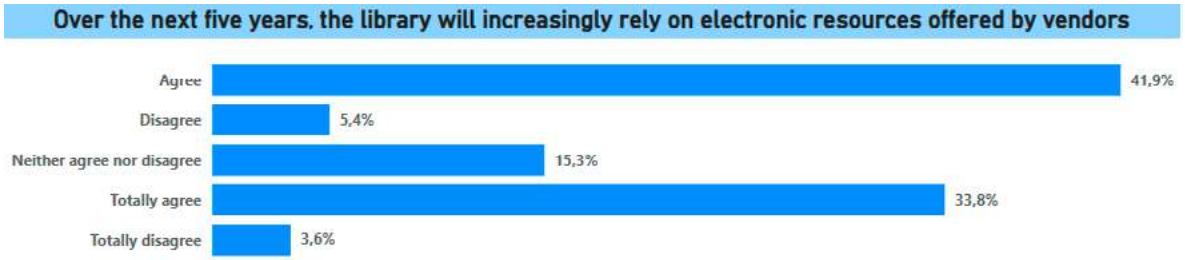
Figure No. 46. Level of technology adoption

To assess the opinion of library leaders in the region on some aspects relevant to the library's future, the survey included questions about their development and status.

The first question was oriented towards the adoption of bibliographic resources in different formats (video, multimedia, audio, virtual reality) in the curricula. In this sense, 81.5% of institutions agreed that this change would occur in the short term, reflecting support for the diversification of educational resources.

Regarding dependence on electronic resources offered by providers in the next five years, 75.7% of institutions agree that this dependence will increase. On the other hand, 50.4% of libraries anticipate dependence on electronic resources produced by the institution itself in the next five years, although 47.6% of institutions do not agree or do not yet have a defined position.

Likewise, on the need to implement strategies to reduce printed material and adapt to the growing demand for electronic resources, 60.8% of institutions agreed, while 32.9% were not completely sure about this transition and 6.3% opposed the idea.



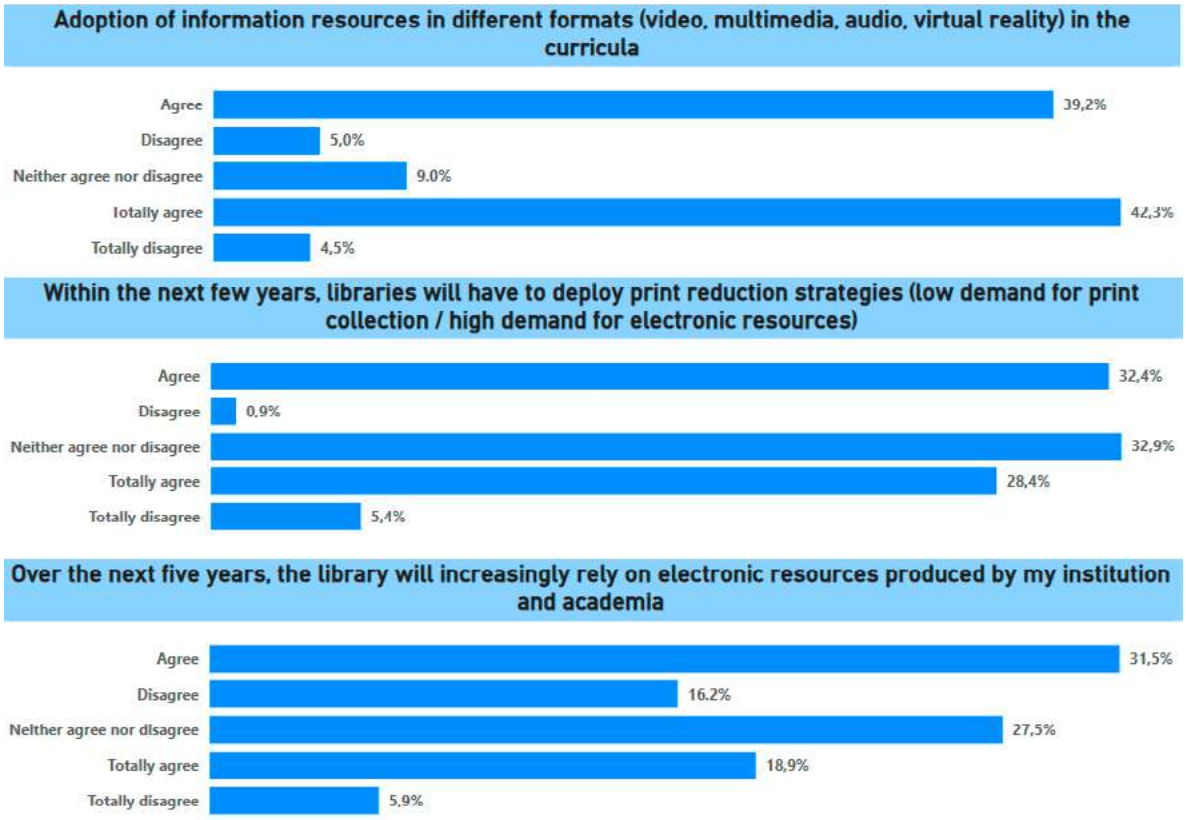


Figure No. 47. Opinion of library leaders on the future of bibliographic collections

SECTION 5: Staff: Multidisciplinary Teams and New Skills

The trend about the need for changes in the formation of work teams in libraries that have new skills and knowledge is present in international reports. For this reason, library leaders were asked about the skills and competencies they value most in their institutions.

In this sense, as can be seen in Figure No. 47, the most valued skills are innovation and creativity with 74.8%. However, agile methodologies are not considered knowledge to promote change management in teams and become the skill with the lowest valuation by leaders (39.6%).

Similarly, leaders value those competencies that energize teams and ensure the development of people, such as strategic planning (74.3%), communication (71.6%), change management (69.8%) and emotional intelligence (67.6%). On the other hand, aspects related to administrative planning (47.3%) and talent management (45%) were addressed as central management skills.

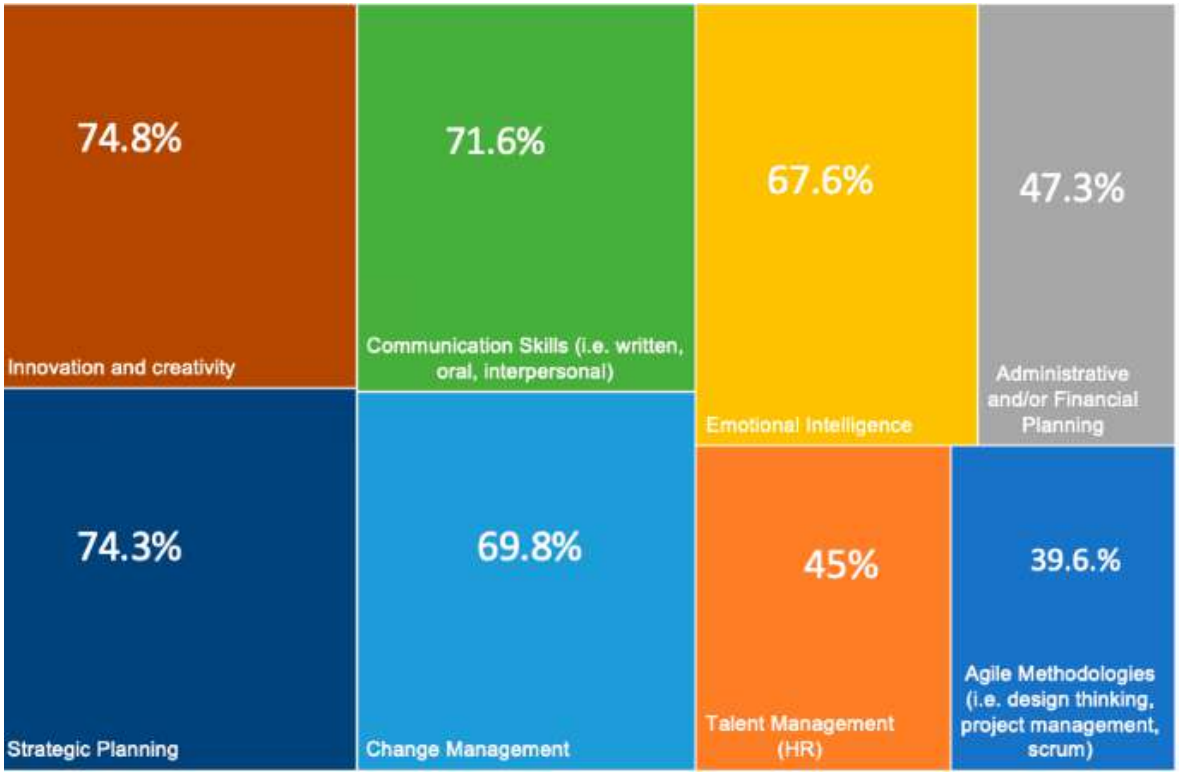


Figure No. 48. Skills valued by leaders

Evolution of the librarian's role

Considering the challenges currently faced by academic libraries, which require information professionals (librarians) to assume new roles beyond their traditional functions, the survey asked leaders about the current state of these new responsibilities.

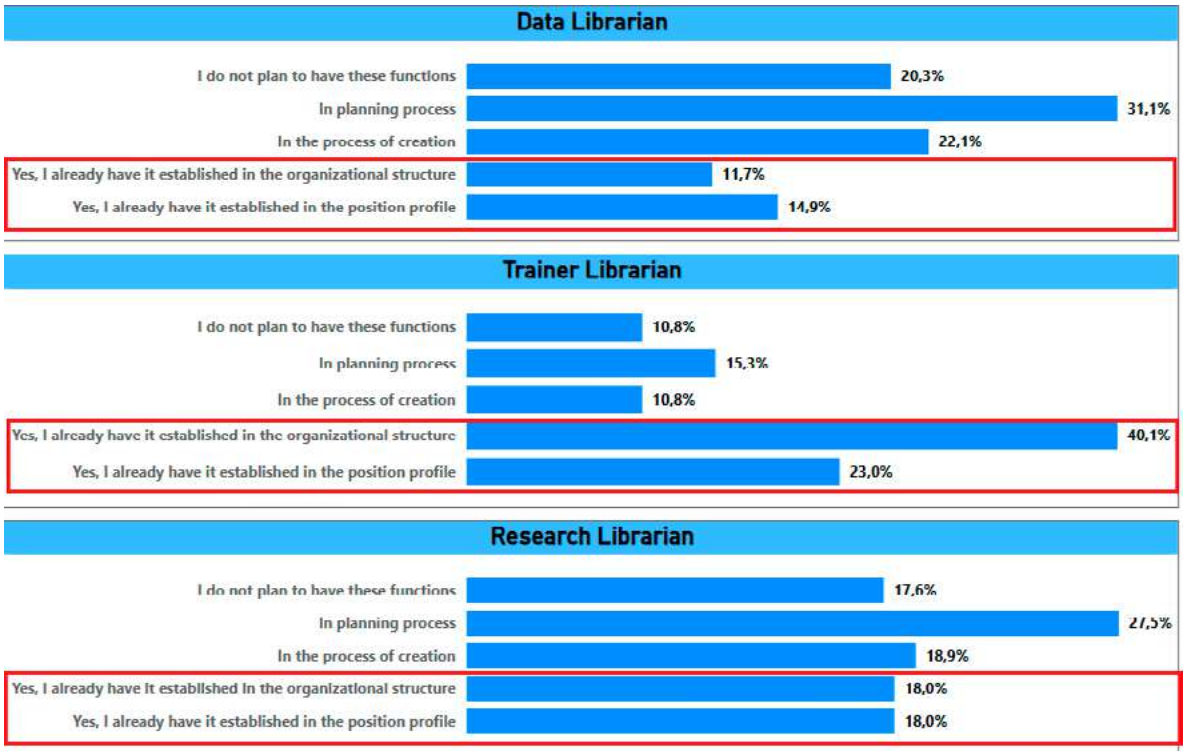
In this regard, the librarian as an educator is the role with the highest level of integration and incorporation into the structure or job profile of the surveyed institutions (63.1%). This reflects a consolidation of the support function for learning and teaching, aimed at enhancing users' informational and digital competencies.

The second role mentioned by the institutions is that of the librarian with skills to serve users with diverse needs (39%), which aligns with the importance of inclusion and diversity in trend reports.

The role of the librarian oriented toward user experience is highly valued among the leaders surveyed, as 38.7% have incorporated it into their structure or profile. This reflects the concern to get involved in institutional strategies for student success.

The librarian role associated with content curation represents 34.7%. It is established or defined in the organizational structure, with a 38% adoption trend in the creation or planning processes.

Finally, regardless of the private or public sector, it is evident that libraries are positively entering the research ecosystem, with roles such as data librarian (26.6%) and research librarian (36%).



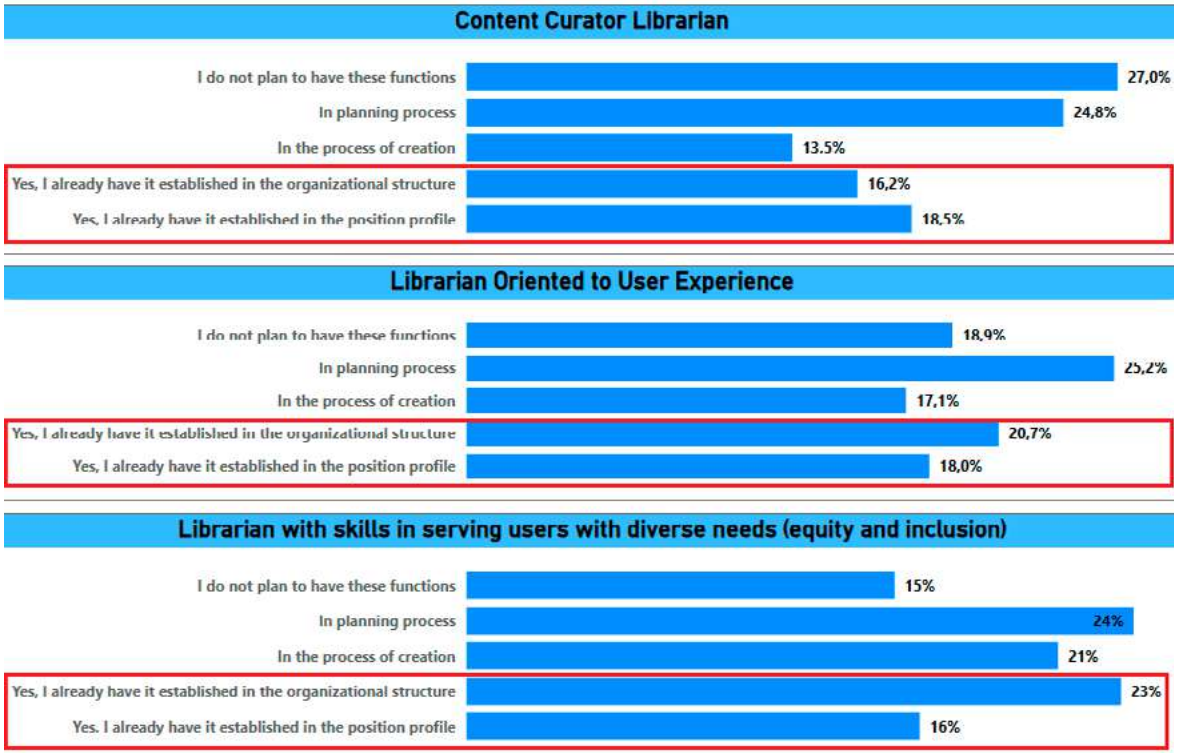
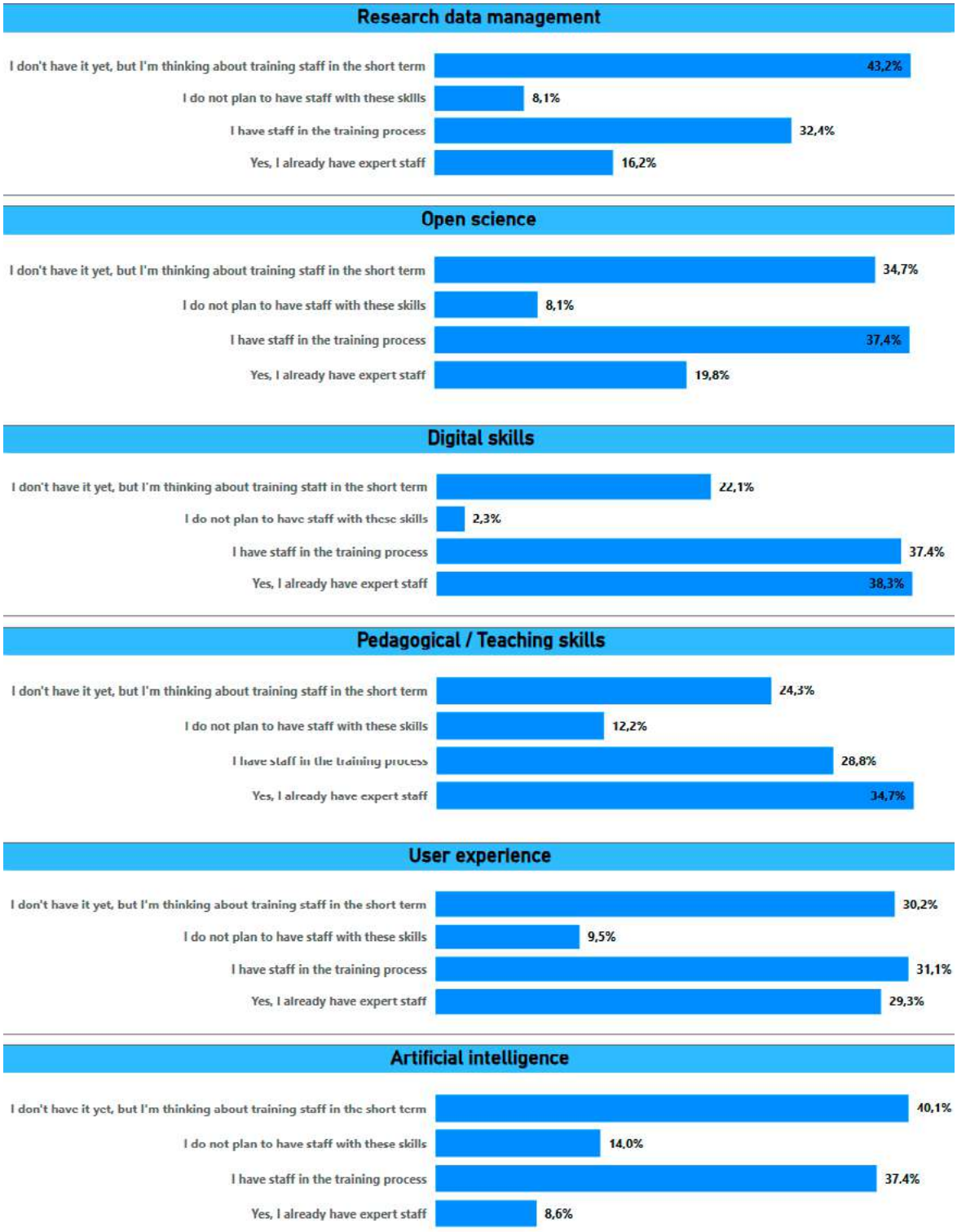


Figure No. 49. Evolution of the librarian's role

Evolution of knowledge and competencies

When addressing new roles in academic libraries, it is necessary to determine the current and future state of the skills, competencies, and knowledge of their contributors. In this regard, libraries have mainly incorporated staff with knowledge oriented towards digital skills (38.3%) and pedagogical skills (34.7%). Similarly, they are training their teams in open science (37.4%), data management (32.4%) and artificial intelligence (37.4%).

Significantly, they are not yet considering developing or training their teams in skills for managing immersive technologies (28.8%) and blockchain (56.8%). It follows that the benefits and impacts of incorporating this knowledge are not required or understood. This trend manifests itself in the same way in both the public and private sector.


Research data management
I don't have it yet, but I'm thinking about training staff in the short term
43,2%
I do not plan to have staff with these skills
8,1%
I have staff in the training process
32,4%
Yes, I already have expert staff
16,2%
Open science
I don't have it yet, but I'm thinking about training staff in the short term
34,7%
I do not plan to have staff with these skills
8,1%
I have staff in the training process
37,4%
Yes, I already have expert staff
19,8%
Digital skills
I don't have it yet, but I'm thinking about training staff in the short term
22,1%
I do not plan to have staff with these skills
2,3%
I have staff in the training process
37,4%
Yes, I already have expert staff
38,3%
Pedagogical / Teaching skills
I don't have it yet, but I'm thinking about training staff in the short term
24,3%
I do not plan to have staff with these skills
12,2%
I have staff in the training process
28,8%
Yes, I already have expert staff
34,7%
User experience
I don't have it yet, but I'm thinking about training staff in the short term
30,2%
I do not plan to have staff with these skills
9,5%
I have staff in the training process
31,1%
Yes, I already have expert staff
29,3%
Artificial intelligence
I don't have it yet, but I'm thinking about training staff in the short term
40,1%
I do not plan to have staff with these skills
14,0%
I have staff in the training process
37,4%
Yes, I already have expert staff
8,6%

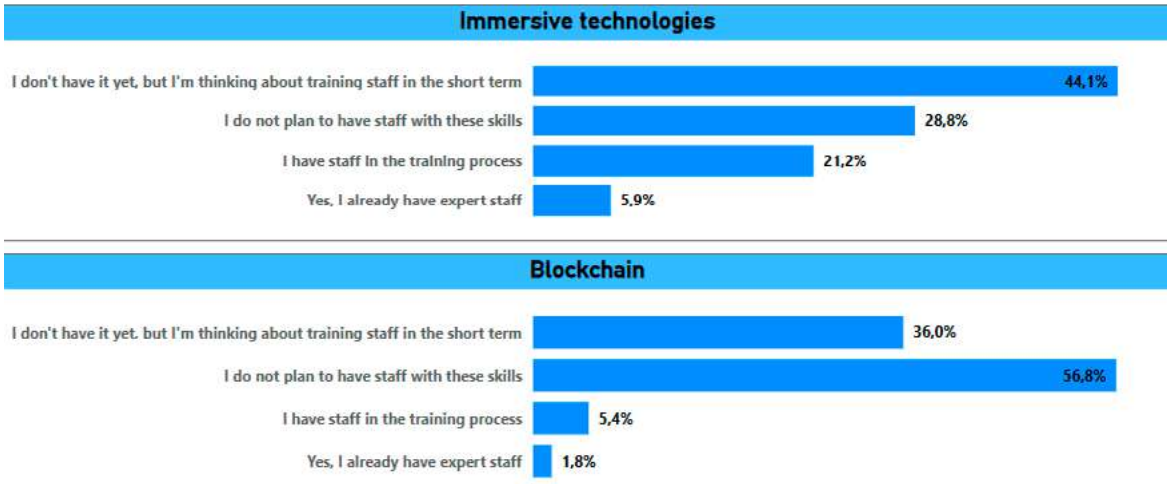


Figure No. 50. Evolution of librarians' knowledge

SECTION 6: Library's impact in higher education institutions

Impact measurement mechanisms

Today, libraries' concern to demonstrate their value in student success and strengthening research (and not simply to be seen as generators of spending) is at the heart of the most pressing trends.

Regarding the measurement mechanisms that are most frequently used, Figure No. 50 reveals that the statistics on the use of printed collections (87.4%), access to digital collections (87.4%) and the use of digital collections (84.7%) stand out.

On the one hand, the high percentage (84.3%) of the presence of academic indicators related to student permanence is striking, but, on the other hand, the low percentage (25.2%) related to the academic performance of students.

Finally, satisfaction with library services, where there is a lower general adoption with a maximum of 46.4% satisfaction, reflects moderate satisfaction with these services, which suggests areas for improvement.

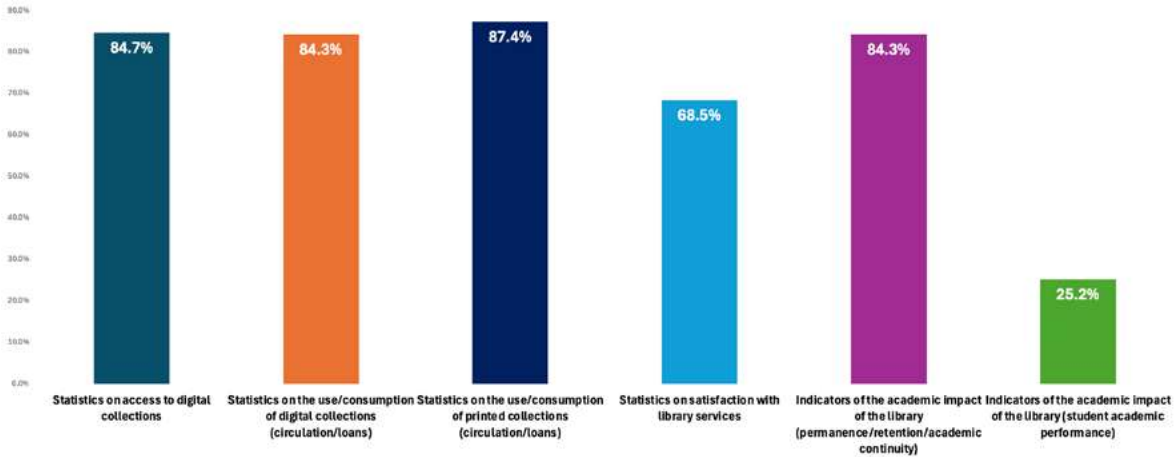


Figure No. 51. Impact measurement mechanisms, considering the selection of the two maximum value responses (5 and 4).

Level of institutional recognition

For libraries to perform innovation processes within their institutions, it is essential that they are recognized, especially by their highest authorities.

In this regard, the survey explores the leaders' opinions about their level of confidence in aligning the library's value proposition with the institution's strategic objectives.

The result shows that 43.7% have very high confidence (level 5), and only 9.1% feel less confident (levels 1 and 2).

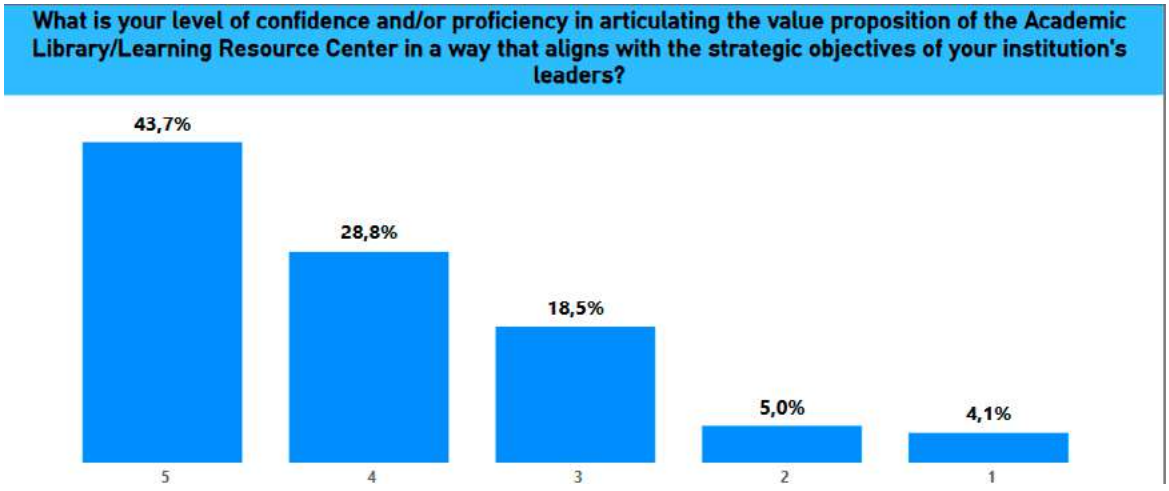


Figure No. 52. Opinion on the level of recognition of the library by institutional authorities.

SECTION 7. Conclusions and final remarks

This section explored the limitations that libraries face in implementing changes. In addition, we asked if there were any important trends, that which, in the opinion of the leaders, had not been addressed in this study.

Likewise, the space was opened for each participating institution to share some significant experience that it has developed and that is consistent with trends, in order to make visible regional good practices and create networking. A full description of this section of the survey is included in Chapter 3 of this report.

Limitations for change

According to the responses received, the main limitations that libraries have faced in making the desired changes are the following: decrease or lack of budget (67.1%), resistance to change (46.4%), lack of skills or updating in staff (46.4%), and lack of change in library profiles (46.4%).

As variables of medium importance in relation to the limitations for change, the following are mentioned: the difficulty in communicating or evidencing the value of the Library/CRAI with other leaders in the institution (36.8%), the lack of inter-institutional collaboration (29.3%) and the limited technology of the providers (28.8%).

As for the variables of lesser relevance in the limitations for change, there are labor restrictions (i.e. union unions) with 18% and flexible or remote work with only 8.6%.

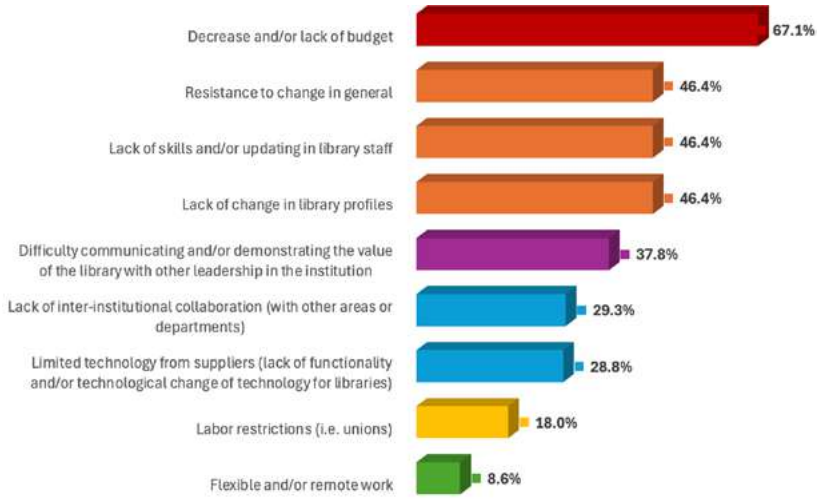


Figure No. 53. Main Limitations for Implementing Change

Unexplored trends

Regarding unexplored trends impacting academic libraries, 56.31% consider the study to be very comprehensive and inclusive of all relevant topics, while the remaining 43.69% mention some trends they believe were missing: new learning methodologies, community engagement, implementation of new technologies, management of bibliographic resources, and budgets and resources.

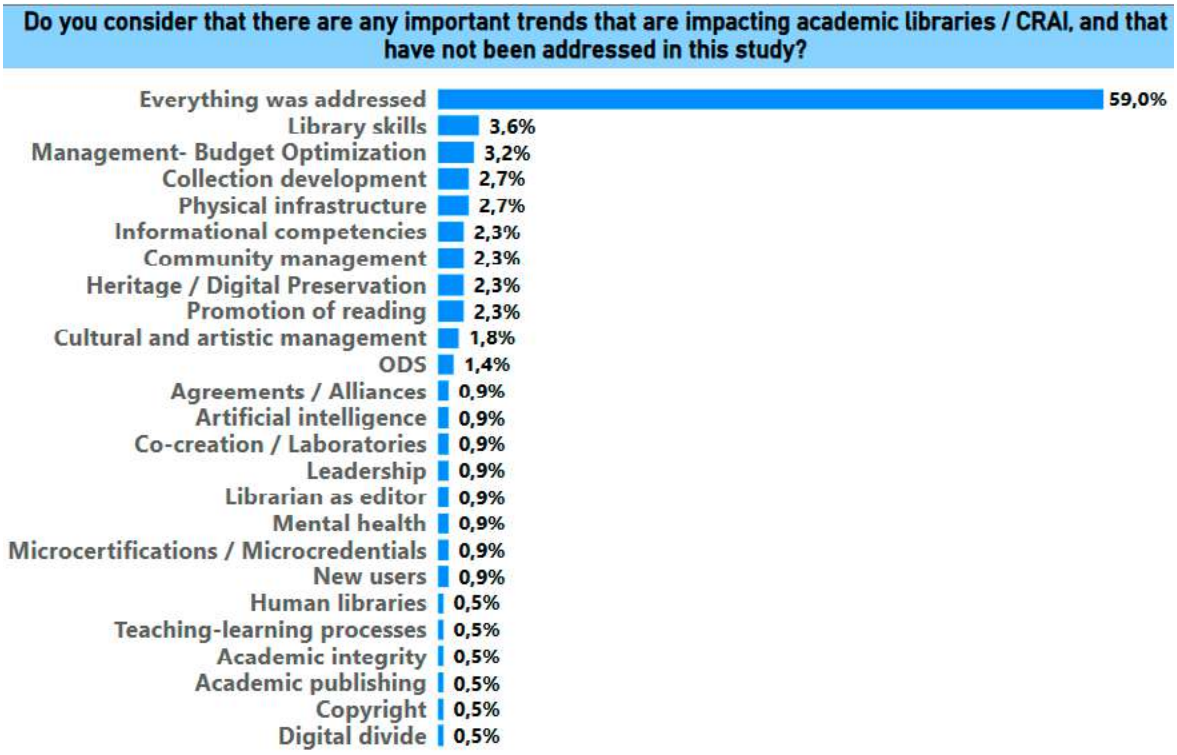


Figure No. 54. Unexplored Trends According to Survey Respondents

The following are the thematic areas suggested by the participants as best practices, where additional categories have been identified that have been addressed in their respective academic libraries or CRAIs:

- Research support services
- Innovative library services
- Inclusive services
- Information literacy
- Social and cultural role of the library (integration with the community)
- Strategic partnerships
- Sustainable Development Goals (SDGs)
- Sustainability
- Conservation and preservation of heritage collections

These suggestions could be addressed in a new version of the study and are not documented in this report as they do not align with the criteria previously established. Finally, for further information on some terms used in this study, a glossary of terms is included (see Appendix No. 2).

CHAPTER 3

Cases with Latin American experiences

As a result of the survey conducted, a set of cases were identified as best practices and innovations. This exploratory consultation aims to reinforce the conclusions of this study and identify reference cases that could assist other higher education institutions in their pursuit of innovation in their libraries.

A total of 78.8% of the surveyed institutions responded that they do not have any innovative experiences or practices, while only 21.2% answered affirmatively. Colombia, Mexico, and Chile were the countries with the highest number of documented experiences.

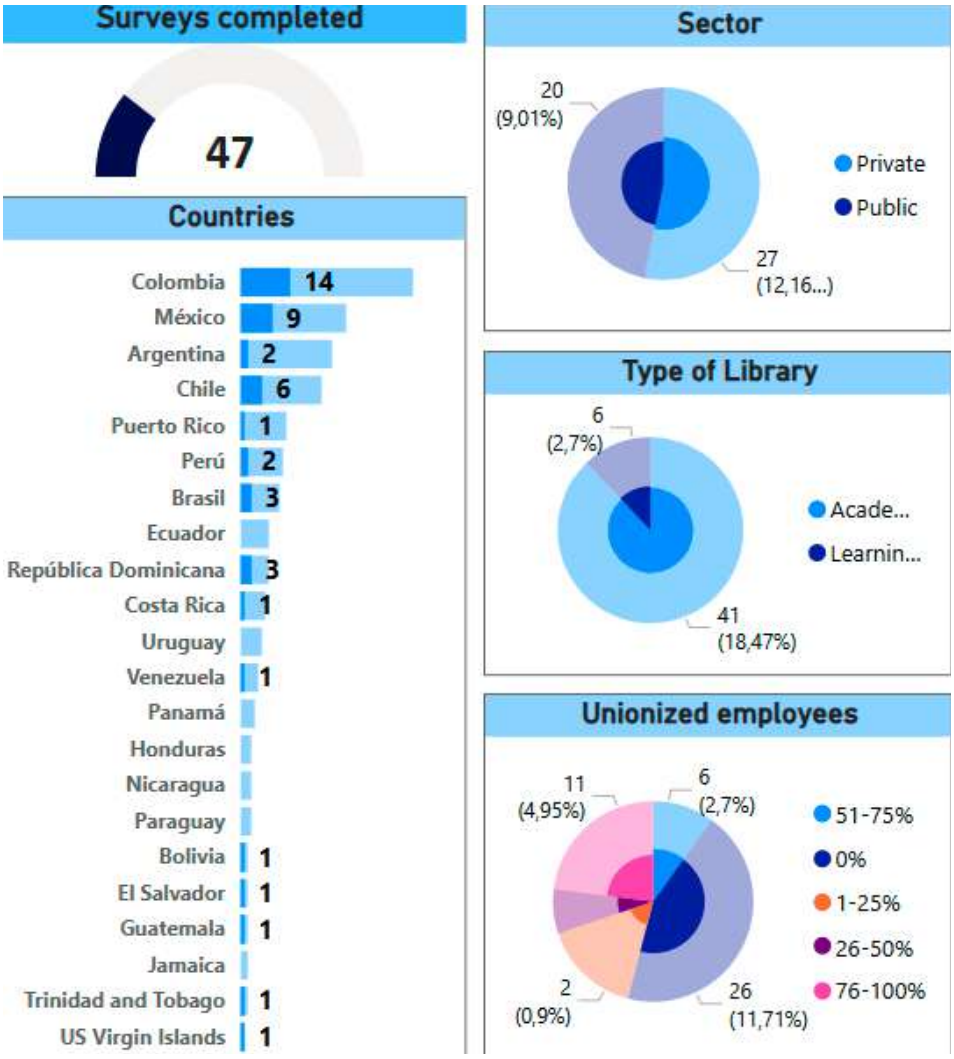


Figure No. 55. Country Representation of Registered Best Practice

In total, 47 libraries reported having cases. However, only 43 of them registered 73 proposals for good practices or experiences, distributed as follows: 9 (3 cases), 12 (2 cases) and 22 (1 case).

All the documented experiences were filtered and categorized according to the trends identified in the study, which resulted in a classification of 33 cases of educational innovation in 19 HEIs.

CATEGORIES	# RECORDED EXPERIENCES	# HEI'S IDENTIFIED	COUNTRIES IDENTIFIED
Adoption of emerging technologies (AI)	2	2	2
Open science (transformative agreements, open data)	7	7	4
Student-Centered Approach (CX) / User Experience (UX)	11	7	4
Educational spaces adopting new technologies	4	4	3
New Cataloging Approaches (Linked Data and Bibframe)	2	2	2
Securing funding and/or financing for library services	1	1	1
Library development programs (new competencies, functions, and skills)	3	3	3
Digital transformation and education	3	2	2

Table No. 2. Best practices related to categories associated with research

The following presents the trends in terms of educational innovation or transformation that academic libraries in Latin America and the Caribbean are adopting in their daily practice through the case studies recorded by the participants, in alignment with the categories mentioned (Table No. 2). The experiences received were classified according to the concepts identified in the literature review addressed in Chapter 2 of this report.

3.1. Digital transformation

This trend in universities goes beyond technology and includes training in digital skills, rather than traditional information literacy. It demands the articulation of educational planning that facilitates doing things differently and that generates benefits such as, for example, greater accessibility, personalization of the learning process, increased efficiency and strengthening of internationalization, collaboration and exchange with other universities and research institutions worldwide. The digital transformation of education can fully support the education agenda and facilitate inclusive and quality training for all students (European Education Area, 2020).

This section presents the recorded experiences under the following categories:

- Adoption of emerging technologies (AI)
- Digital transformation and education

Case 1

ADOPTION OF EMERGING TECHNOLOGIES (AI)	
Contributing university	Universidad Francisco Gavidia (El Salvador)
Project title	Chatbot service, WhatsApp Business and voice search
Brief Description (Abstract). Integrating innovative applications within the range of library services to enhance user experience, provide support in the digital environment, and facilitate the use of electronic information resources with inclusivity.	
URL: https://ebiblioteca.ufg.edu.sv/opac-tmpl/bootstrap/bweb20/bibufg/index4.php	

Case 2

ADOPTION OF EMERGING TECHNOLOGIES (AI)	
Contributing university	Pontificia Universidad Javeriana (Colombia)
Project title	Laboratory of digital humanities and methods
Brief Description (Abstract). The establishment of an interdisciplinary laboratory created in collaboration with two faculties and the General Library, yielding results in digital skills development and contributions to research processes. Additionally, it has been proposed as a business unit for the University.	
URL: www.javeriana.edu.co/biblos/w/nuevos-talleres-del-laboratorio-interdisciplinar	

Bibliotecas

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Pontificia Universidad JAVERIANA

El Laboratorio Interdisciplinario de Humanidades y Métodos Digitales de la PUJ ofrece dos talleres en el mes de octubre dirigidos a la Comunidad Educativa Javeriana.

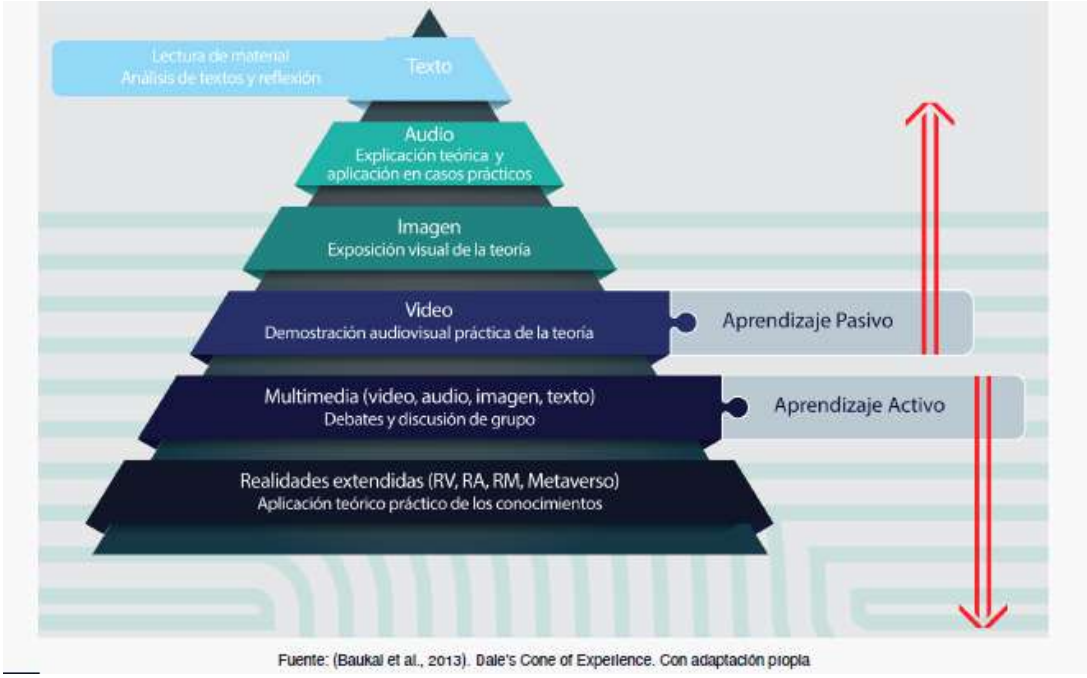
Nuevos talleres del Laboratorio Interdisciplinar de Humanidades y Métodos Digitales

El Laboratorio Interdisciplinario de Humanidades y Métodos Digitales de la Pontificia Universidad Javeriana (LIHM) es un espacio de encuentro, enseñanza, creación, experimentación e investigación que aprovecha y explora las posibilidades del uso de las tecnologías digitales desde una perspectiva crítica e innovadora para el desarrollo de recursos, la investigación y difusión del conocimiento interdisciplinario. El laboratorio está conformado por la Facultad de Ciencias Sociales, la Facultad de Comunicación y Lenguaje y las Bibliotecas PUJ.

Los talleres que ofrece el laboratorio en el mes de octubre a la Comunidad Educativa Javeriana (estudiantes, docentes, administrativos y egresados de PUJ Bogotá y Cali) son los siguientes:

Case 3

DIGITAL TRANSFORMATION AND EDUCATION	
Contributing university	Tecnológico de Monterrey (México)
Project title	Evolution of digital collections in academic libraries
Brief Description (Abstract). The “Multiformat Digital Library” project aims to recognize the value of learning content that enhances students’ experiences, aligning with the institution’s digital education strategy and the consolidation of its educational model. This is achieved by facilitating access to information resources that ensure support for digital learning experiences, both sufficient and permanent, to sustain blended and distance learning modalities, as well as to enrich face-to-face learning formats.	
URL: https://hdl.handle.net/11285/650692	



Fuente: (Baukal et al., 2013). Dale's Cone of Experience. Con adaptación propia

Case 4

DIGITAL TRANSFORMATION AND EDUCATION	
Contributing university	Universidad del Rosario (Colombia)
Project title	Biblioteca Humana (Human Library)
Brief Description *(Abstract)*. The Human Library of Universidad del Rosario is a unique project worldwide that promotes open and inclusive access to knowledge. Through a free streaming platform, it offers an unforgettable experience to its readers and provides an opportunity to preserve the personal knowledge of individuals with life stories worth learning from.	
URL: https://bibliotecahumana.urosario.edu.co	

Case 5

DIGITAL TRANSFORMATION AND EDUCATION	
Contributing university	Universidad del Rosario (Colombia)
Project title	Digital Competencies Training Program: From Theory to Practice
Brief Description (Abstract). The CRAI of the UR has created a digital competencies training model based on the European Framework DigComp2.2. The model encompasses five training areas and is implemented through two programs: one for students and one for faculty. Both start with a diagnostic test that classifies competency levels and offers tailored training pathways, including workshops, consultations, and courses. Upon completion, participants can earn digital badges to certify their skills and accomplishments.	
URL: https://urosario.edu.co/crai/inicio/trayectoria-competencias	

3.2. Open Science

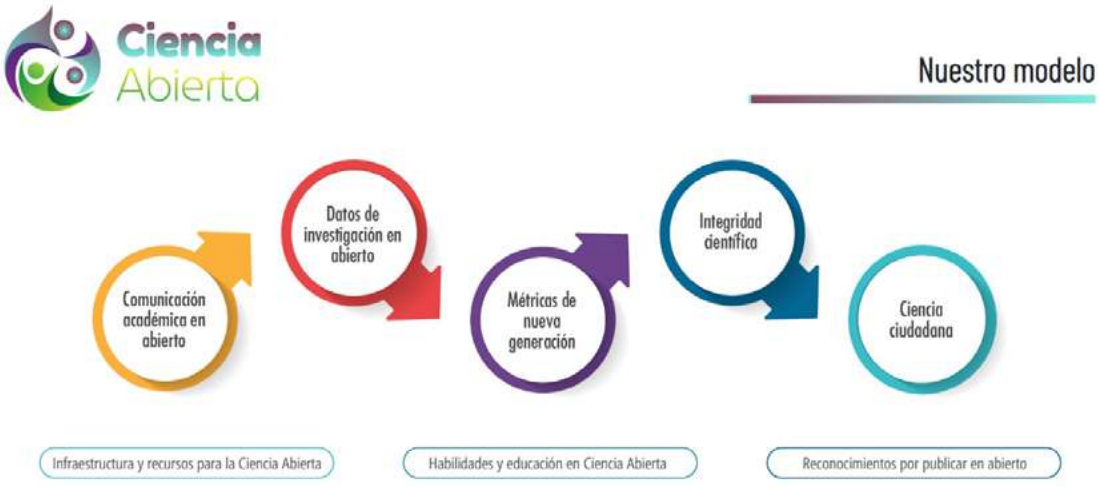
The open science movement is centered around a collaborative and transparent approach aimed at democratizing access to knowledge. It is based on principles such as open access, collaboration among researchers, and active participation of the society. This approach accelerates the process of innovation and development in various fields, with the goal of achieving rapid and effective solutions to complex problems.

This section presents the experiences recorded under the category:

- Open science (transformative agreements, open data)

Case 6

OPEN SCIENCE	
Contributing university	Universidad del Rosario (Colombia)
Project title	The Open Science Model
Brief Description (Abstract). The foundations of the project are developed around five general pillars and three cross-cutting ones, which strengthen research, evaluation, and academic communication with an inclusive, collaborative, and transparent approach aimed at generating a significant and relevant impact on society.	
URL: https://cienciaabierta.urosario.edu.co/	

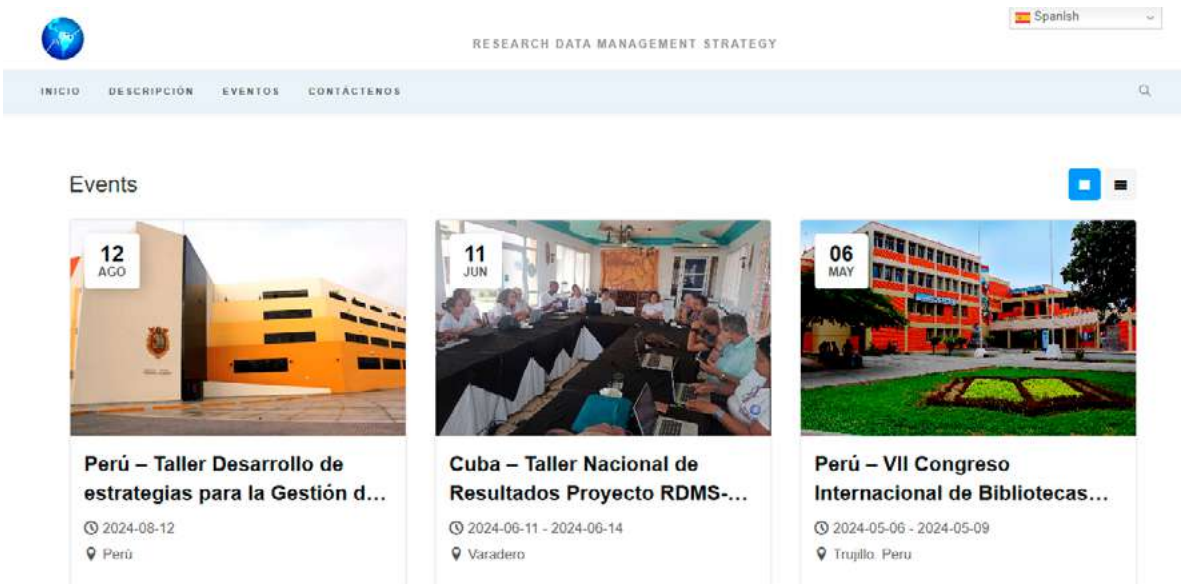


Case 7

OPEN SCIENCE	
Contributing university	Universidad Católica de la Santísima Concepción (Chile)
Project title	Project Award: “Establishing an Open Science Culture within the UCSC University Community”
Brief Description (Abstract). The National Agency for Research and Development (ANID) collaborated with the Research Directorate to allocate funds to implement an open science culture at the University. This initiative aims to democratize knowledge by establishing a research data repository where researchers can deposit their research datasets.	
URL: https://cienciaabierta.ucsc.cl	

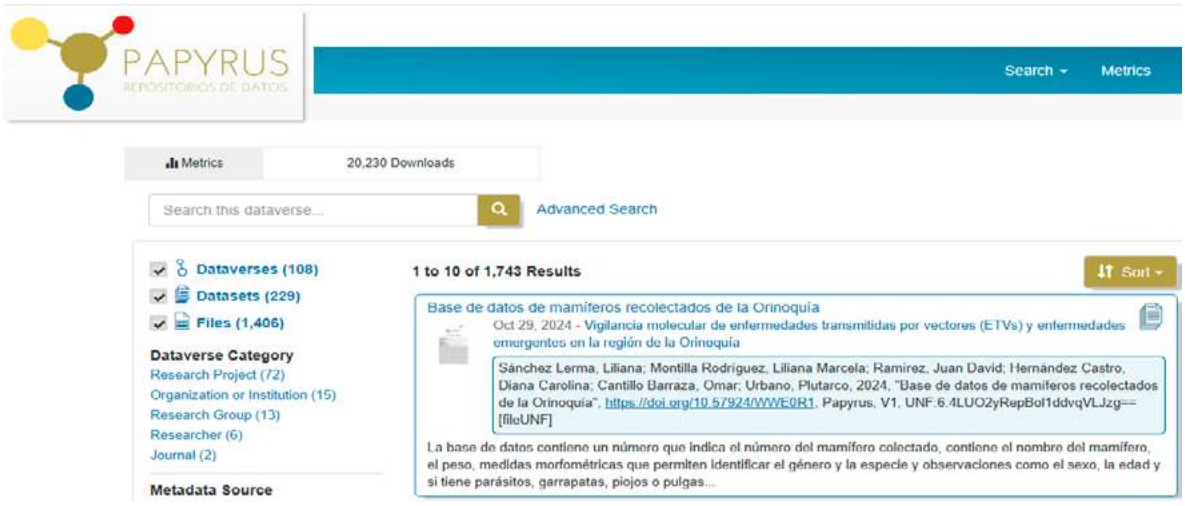
Case 8

OPEN SCIENCE	
Contributing university	Universidad Católica Boliviana San Pablo (Bolivia)
Project title	Research Data Management Strategy
Brief Description (Abstract). Research data management (RDM) is based on the so-called FAIR principles of data, the fundamental objective of which is to make scientific data freely locatable, accessible, interoperable and reusable; thus promoting collaboration between researchers, the genesis of new research and the socialization of knowledge. The adoption of these principles for data management in institutions has already become the standard of RDM good practice. The main objective of this project is to develop capacities to promote the adoption of good practices in research data management in Cuban, Peruvian, and Bolivian higher education institutions, also contributing to the improvement of this topic in the Latin American context.	
URL: https://rdmslatam.vlired.cu	
REGIONAL COLLABORATIVE PROJECT (CUBA-PERU-BOLIVIA)	



Case 9

OPEN SCIENCE	
Contributing university	Universidad del Rosario (Colombia)
Project title	Research data repository *Papyrus*. Colombian consortium project
Brief Description (Abstract): The Papyrus project is a consortium-based research data repository involving 15 Colombian universities, which share a common platform and manage DataCite DOIs. This collaborative approach reduces infrastructure-related costs, enhances institutional expertise, and fosters the sharing of best practices in the management and open access of research data. Currently, more than 228 datasets have been deposited, significantly increasing the visibility of the participating institutions.	
URL: https://papyrus-datos.co	
NATIONAL COLLABORATIVE PROJECT (COLOMBIA)	



Case 10

OPEN SCIENCE	
Contributing university	Pontificia Universidad Javeriana (Colombia)
Project title	Transformative agreements in Colombia and in the libraries of the Javeriana

Brief Description (Abstract). Transformative agreements are a negotiation pathway between institutions and publishers aimed at transforming the traditional subscription-based model of academic and scientific journal publishing into an open access model. This means that a portion of the funds paid for accessing the digital content of subscribed resources is allocated to the publication of articles in open access within hybrid journals (subscription-based journals that publish some articles in open access), without additional charges.

URL: www.javeriana.edu.co/biblos/w/javeriana-primera-en-acuerdos-transformativos-con-iop-y-wiley
https://javeriana.libguides.com/c.php?g=1058475&p=9702588

NATIONAL COLLABORATIVE PROJECT (COLOMBIA)

Acuerdos Transformativos para la PUJ 2024

Editor	Total de Articulos por año para PUJ	Cupos Utilizados 2024	Cupos Disponibles 2024	Total de Revistas donde publicar para PUJ	Financiación	Periodo del Acuerdo
Wiley**	20	20	0	1.896	Acuerdo Transformativo con Bibliotecas PUJ	2023-2026
IOP Publishing	Ilimitado	0	Ilimitado	76	Acuerdo Transformativo con Bibliotecas PUJ	2023-2025
Elsevier*	6	22	*	1.658	Acuerdo Transformativo con Consorcio Colombia	2022-2024
Springer Nature*	15	17	*	2.090	Acuerdo Transformativo con Consorcio Colombia	2022-2024
Taylor & Francis*	USD $14.310	5	0	2.237	Acuerdo Transformativo con Consorcio Colombia	2022-2024
Cambridge	Ilimitado	-	-	482	Acuerdo Transformativo con Consorcio Colombia	2024
Sage	Ilimitado - Para autores colombianos	0	Ilimitado	369 Revistas distribuidas así: 211 Revistas: sin costo en el APC 158 Revistas con 70% de descuento en el APC	Sage	2024
Total		64	0		Cifras al 10 de octubre 2024	

*Con las editoriales Elsevier, Springer Nature y Taylor & Francis, el cupo puede aumentar por los cupos no utilizados por otras instituciones del Consorcio Colombia
**Con la editorial Wiley, el cupo del año 2024 se encuentra finalizado, sin embargo, si alguno de los artículos que se encuentran en flujo editorial es rechazado el cupo se libera.

Case 11

OPEN SCIENCE	
Contributing university	University of Puerto Rico, Rio Piedras Campus (Puerto Rico)
Project title	Transformative agreements at the UPR of Río Piedras: pioneers in open access publishing

Brief Description (Abstract). A transformative agreement is a contract between institutions, such as libraries and consortia, and publishers, where funds previously allocated to subscriptions are redirected to support open access publication for authors affiliated with the negotiating institutions. These agreements are designed to address critical challenges in current research, such as the rising costs of subscriptions, limited access to research in developing countries, and the need to promote open science. Currently, the University of Puerto Rico, Río Piedras Campus, is the only academic institution in the Caribbean participating in this type of agreement, with a total of four active transformative agreements.

URL: https://uprrp.libguides.com/acuerdostransformativos

Case 12

OPEN SCIENCE	
Contributing university	University of Chile (Chile)
Project title	Open Science course at the University of Chile
Brief Description (Abstract). The course aims to provide an understanding of the basic principles and concepts of open science as a movement and practice, as well as to identify the different related components. Topics such as open access publications, open research data, the use of tools for data management and the ethical and legal aspects are addressed. Upon completion of the course, participants will be able to implement open science practices in different aspects of their work.	
URL: https://eol.uchile.cl/courses/course-v1:eol+VID-CA+2023_2a/about	

3.3. New approaches to cataloging

The evolution of cataloging standards and advances in the use of metadata have transformed how information is organized and accessed in libraries. The implementation of standards such as Linked Data and the Bibframe model represents a shift toward interconnected and semantic cataloging systems that enhance the visibility and accessibility of resources, while also promoting greater interoperability between institutions.

This section presents the experiences recorded under the category:

- New Approaches to Cataloging (Linked Data and Bibframe)

Case 13

NEW APPROACHES TO CATALOGING (LINKED DATA AND BIBFRAME)	
Contributing university	Universidad de Concepción (Chile)
Project title	Implementing BIBFRAME at the library
Brief Description (Abstract). The migration of MARC records to Bibframe resources and the policy changes according to the Case have been carried out. It has been possible to create linked open data from BIBFRAME resources, which can be linked from the outside. The connection of the catalog in BIBFRAME with information from the authors and professors of the university is projected.	
URL: https://bibliotecas.udec.cl/a-un-click-de-distancia-bibliotecas-udec-incorpora-estandar-pionero-en-america-latina-para-la-descripcion-de-recursos	

Case 14

NEW APPROACHES TO CATALOGING (LINKED DATA AND BIBFRAME)	
Contributing university	Universidad de Bogotá Jorge Tadeo Lozano (Colombia)
Project title	Visibility of researchers and research through linked data

Brief Description (Abstract). The presented development is part of a broader effort to consolidate the knowledge produced by Tadeo researchers. This involves collecting and organizing their academic products, including profiling and using unique identifiers to efficiently access data related to your research. By integrating digital and physical academic products, such as implementing technologies like Bibframe and HTML, the information is structured optimally, enhancing the user experience when interacting with the available resources. This allows for a detailed and linked description of the works produced by the author. This promotes interoperability between information systems, fostering open access and the dissemination of knowledge generated by the academic community.

URL: https://expeditiorepositorio.utadeo.edu.co/handle/20.500.12010/34740
https://www.utadeo.edu.co/es/link/sistema-de-bibliotecas/104046/bibframe-linked-data

3.4. Student-Centered approach

User-centered experience design is essential for fostering an effective and accessible learning environment. A well-designed experience not only facilitates access to resources and services but also promotes user engagement and satisfaction—key elements for academic success. By prioritizing the user experience, libraries can become dynamic and appealing spaces that support knowledge development.

This section presents the experiences recorded under the following categories:

- Student-Centered Approach (CX)
- User Experience (UX)

Case 15

STUDENT-CENTERED APPROACH (CX)	
Contributing university	Pontificia Universidad Católica Argentina (Argentina)
Project title	User-Centered Management Model of the PUCA Library System
Brief Description (Abstract). The changes implemented are based on the evaluation results of the Library System and the methodologies applied to transform its management model into a user-centered one. Sharing this experience aims to contribute to the reflection on the new roles and functions of librarians, potential management models, and the importance of the organizational cultural shift that the library community must undertake.	
URL: https://youtu.be/kw7dUbEkOEw?si=OQyFs-WunKd49e1d https://biblioteca.uca.edu.ar/sibuca20.html	

Case 16

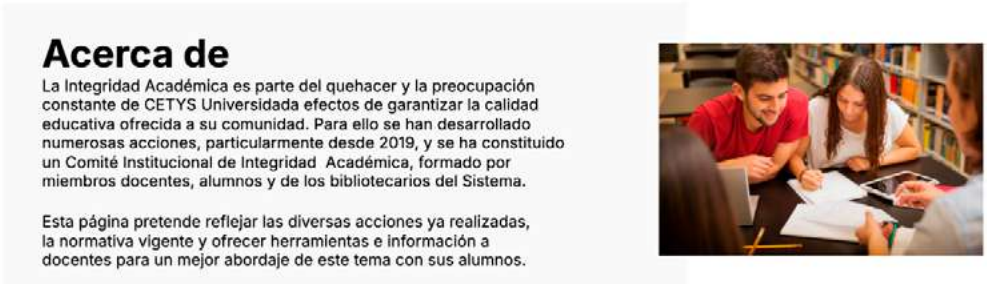
STUDENT-CENTERED APPROACH (CX)	
Contributing university	Universidad Tecnológica de Bolívar (Colombia)
Project title	HiperOpac
Brief Description (Abstract). Mobile web integration to the catalog that places the user in the collection, reducing the search time by 90-95%.	
URL: https://www.utb.edu.co/biblioteca/	

Case 17

STUDENT-CENTERED APPROACH (CX)	
Contributing university	Universidad Católica de Pereira (Colombia)
Project title	CRAI tutoring, personalized service in academic writing
Brief Description (Abstract). Specifically, the academic writing tutoring focuses on supporting the structuring of cohesive, coherent, and relevant texts, aligned with the intended discourse required by each document.	
URL: https://biblioteca.ucp.edu.co/tutorias-crai/	

Case 18

STUDENT-CENTERED APPROACH (CX)	
Contributing university	CETYS Universidad (México)
Project title	Leadership in academic integrity
Brief Description (Abstract). The CETYS University Library System is committed to advancing the institution's academic integrity strategy through the Institutional Academic Integrity Committee and the implementation of the 2023–2025 Academic Integrity Plan. This effort is further supported by research projects and the annual Academic Integrity Conferences. Some activities within this strategy include the development of guidelines for the use of AI tools, a training plan for Information Literacy Skills (ILS), and the provision of workshops on writing and information culture, among others.	
URL: www.cetys.mx/integridad-academica	



Case 19

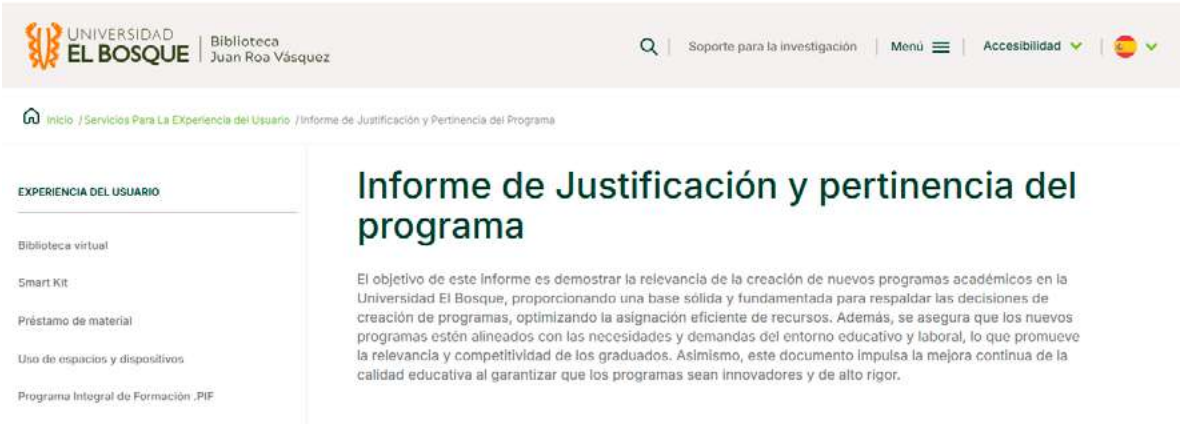
USER EXPERIENCE (UX)	
Contributing university	National University of Colombia, Sede Medellín (Colombia)
Project title	Strategic Surveillance Service

Brief Description (Abstract). The Library of the National University of Colombia, located in Medellín, provides universities and companies with the Strategic Surveillance Service. This service, through a systematic and organized process of searching, detecting, analyzing, and communicating information, serves as a valuable management tool that enables anticipating changes and making informed decisions with reduced risk. It is particularly beneficial in fostering the development of skills in innovation, productivity, and competitiveness.

URL: https://bibliotecas.unal.edu.co/sede-medellin/servicios/servicios-en-la-sede/vigilancia-estrategica

Case 20

USER EXPERIENCE (UX)	
Contributing university	Universidad El Bosque (Colombia)
Project title	Pre-feasibility and relevance reports and competitiveness reports
Brief Description (Abstract). Reports were designed to assess the current market based on its national and international academic offerings, academic demand, and labor market conditions. In this case, the prefeasibility and relevance of introducing new programs at the institution are evaluated, as well as the competitiveness of existing programs.	
URL: https://hdl.handle.net/20.500.12495/12388	



Case 21

USER EXPERIENCE (UX)	
Contributing university	Pontificia Universidad Católica de Chile (Chile)
Project title	Scientific and Technological Strategic Information UC Libraries
Brief Description (Abstract). Through the Scientific and Technological Strategic Information area (ICYT), support is provided for decision-making in the management, measurement, and evaluation of scientific and technological research produced within institutions. This is achieved through services and products that help assess and enhance the positioning of researchers' work both nationally and internationally.	
URL: https://bibliotecas.uc.cl/investigacion/icyt	

Case 22

USER EXPERIENCE (UX)	
Contributing university	Universidad El Bosque (Colombia)
Project title	Bibliofaculty
Brief Description (Abstract). Bibliofaculty focuses on interal training, providing resources and empowering library managers to develop strategies and strengthen communication bridges with faculty representatives (deans, teachers, researchers and student representatives). This approach enables the library to address existing needs while gathering relevant information about emerging needs expressed by the diverse profiles within the faculty, fostering a process of continuous improvement. Unlike a specialized reference service, Bibliofaculty is grounded in targeted and direct communication aimed at effectively managing various requests from the faculty and responding to their perceived needs efficiently.	
URL: https://hdl.handle.net/20.500.12495/12389	

Case 23

USER EXPERIENCE (UX)	
Contributing university	Universidad Santo Tomás (Colombia)
Project title	“Donate your voice”
Brief Description (Abstract). In alignment with the inclusive education policy at Universidad Santo Tomás and in accordance with the Marrakech Agreement, “Donate Your Voice” was created as a service to promote inclusion within the CRAI and contribute to Sustainable Development Goal 4 (ensuring inclusive, equitable, and quality education). Launched in 2017, this initiative emerged after the enrollment of blind students in the Law and International Business programs at the university. It is built around three core pillars: enhancing the soft skills of the staff, acquiring technological resources, and engaging the educational community in activities such as reading sessions and the description of various forms of information representations, including images, illustrations, tables, and diagrams.	
URL: https://repository.usta.edu.co/handle/11634/51371	

3.5. New education spaces

Libraries offer a conducive learning environment in a controlled setting, capable of bringing together and showcasing diverse information resources for learning. The construction of new spaces not only provides access to existing resources but also fosters collaboration, creativity, and critical thinking, transforming versatile environments that adapt to diverse educational requirements. These spaces contribute to comprehensive student training and the development of a robust learning culture.

In this section, you'll find recorded experiences categorized as:

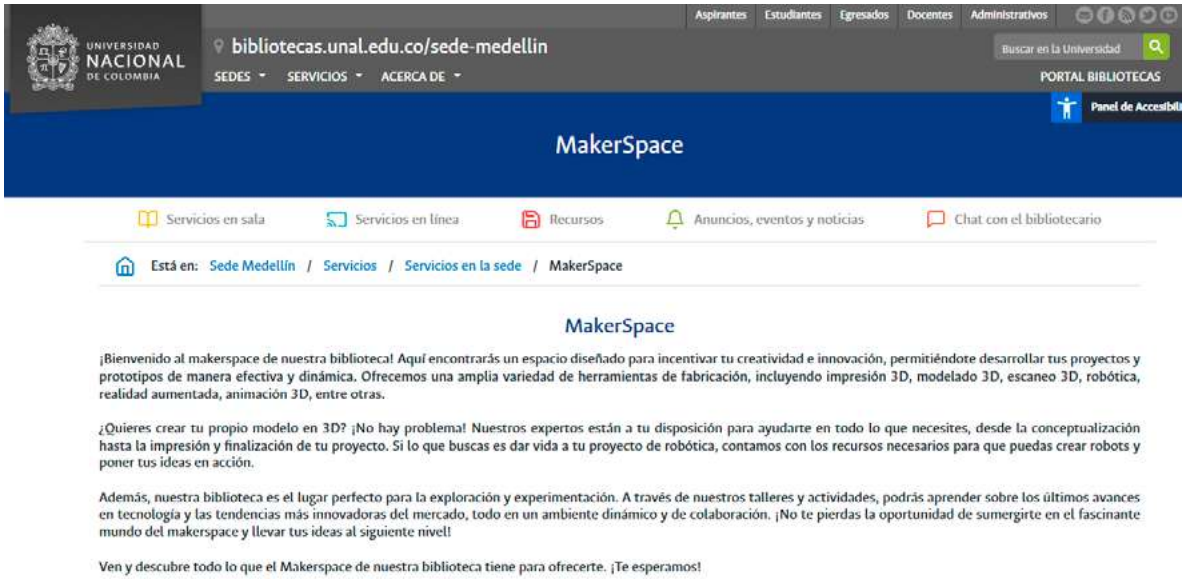
- Extended and immersive realities
- Educational spaces embracing innovative technologies

Case 24

EXTENDED AND IMMERSIVE REALITIES	
Contributing university	Tecnológico de Monterrey (México)
Project title	VR Zone at the Library
Brief Description (Abstract). VR Zone consists of the integration of an educational space with virtual reality (VR) technology that facilitates learning scenarios, allowing users to interact and have the sensation of truly being there. The educational space, conceived in 2019, is made up of workstations, each one equipped with virtual reality headsets, also known as VR goggles, VR visors, or HMDs (head-mounted displays), which are visualization devices that allow comput-er-generated images to be displayed on a screen very close to the eyes.	
URL: https://biblioteca.tec.mx/inicio/zonavr https://www.comie.org.mx/congreso/memoriaelectronica/v16/doc/0866.pdf	

Case 25

EDUCATIONAL SPACES EMBRACING INNOVATIVE TECHNOLOGIES	
Contributing university	Universidad Nacional de Colombia, Sede Medellín (Colombia)
Project title	Makerspaces, democratic spaces for innovation
Brief Description (Abstract). The Makerspace of the Library Division of the National University of Colombia at Medellin, has been a key space for hands-on learning and innovation since 2017. Equipped with advanced technologies, such as 3D printing, 3D scanning, and mixed reality, it has supported more than 120 academic projects and trained more than 7,900 users in robotics, programming, and others.	
URL: https://bibliotecas.unal.edu.co/sede-medellin/servicios/servicios-en-la-sede/makerspace	



Case 26

EDUCATIONAL SPACES EMBRACING INNOVATIVE TECHNOLOGIES	
Contributing university	Universidad El Bosque (Colombia)
Project title	New spaces and diversification of services

Brief Description (Abstract). In January 2024, the library expanded its spaces by creating a co-creation and innovation room, designed to host various innovative activities. The space is adaptable, and the furniture can be rearranged according to the requirements of each session. The DataLab is equipped with 15 computers featuring the latest hardware and software (both open and proprietary). The technological interaction space aims to use educational media, primarily virtual learning objects, in a mixed environment (a 75-inch TV and physical boards), allowing for a new form of interaction with educational resources.

URL: https://biblioteca.unbosque.edu.co/acerca-de-la-biblioteca/espacios-fisicos-y-recorrido-virtual

Case 27

EDUCATIONAL SPACES EMBRACING INNOVATIVE TECHNOLOGIES	
Contributing university	Pontificia Universidad Católica de Chile (Chile)
Project title	Makerspace: Manufacturing Lab

Brief Description (Abstract). A space dedicated to creativity and practical learning, this facility offers resources and infrastructure to develop innovative and creative projects, such as 3D printers and laser cutters. Workshops are held to teach users how to design and print using 3D printers, which materialize 3D objects with various materials and shapes. Users are also trained in the precise and high-quality use of laser cutting, a technique that cuts and engraves various materials. These activities aim to foster creative, technical, and collaborative skills within the university community.

Key highlights of the initiative include collaboration with over thirty units across Engineering, Health Sciences, Chemistry, Civil Construction, Design, Physics, Anthropology, and Archaeology since 2020. More than 2500 3D printed models have been delivered, with at least 40% related to academic work. Additionally, the average occupancy rate for laser cutters in 2024 is 60%, utilizing the available hours through LibCal.

URL: https://guiastematicas.bibliotecas.uc.cl/c.php?g=1226564&p=9983786

3.6. Income diversification

The diversification of income in academic libraries is a trend that not only addresses the changing needs of the educational environment but also aims to strengthen the sustainability of projects that complement their traditional resources and services.

This section includes the experiences recorded under the category:

- Securing funding and/or financing for library services

Case 28

SECURING FUNDING AND/OR FINANCING FOR LIBRARY SERVICES	
Contributing university	Universidad Jorge Tadeo Lozano (Colombia)
Project title	Generating income to the University from the library
Brief Description (Abstract). The design and offering diploma programs and short term courses aim to support complementary training in theoretical, practical, and functional aspects that are highly relevant for librarians, professionals from various fields of knowledge, and society in general. This initiative began in 2019 in person. However, starting in 2020, the various courses and certificate programs have been offered virtually, expanding participation to the international community.	
URL: www.utadeo.edu.co/es/link/sistema-de-bibliotecas/104046/diplomados-y-cursos	

3.7. New roles of the academic libraries

Academic libraries are constantly facing the challenge of evolving to meet the changing needs of their communities, and with this comes the need to adjust the role of the librarian. Adapting to new services and resources brings new responsibilities, for which work teams must develop strategies aimed at strengthening not only access to new information resources and services but also creating meaningful experiences that foster recall and emotional, cognitive, and behavioral connections.

This section includes experiences recorded under the categories:

- New structures, profiles, and roles of library staff
- Library development programs (new competencies, functions, and skills)

Case 29

NEW STRUCTURES, PROFILES, AND ROLES	
Contributing university	Pontificia Universidad Javeriana (Colombia)
Project title	Organization transformation towards library innovation
Brief Description (Abstract). The process of implementing ambidextrous innovation as a work strategy has involved the cultural, organizational, and structural transformation of the library through horizontal movements, the initiation of self-management strategy development, the creation of a disruptive innovation area, and the establishment of an organic horizontal structure.	
URL: www.javeriana.edu.co/biblos www.javeriana.edu.co/repositorio-hoy-en-la-javeriana/fomentando-una-cultura-innovadora-en-la-biblioteca-general	

Fomentando una cultura innovadora en la Biblioteca General

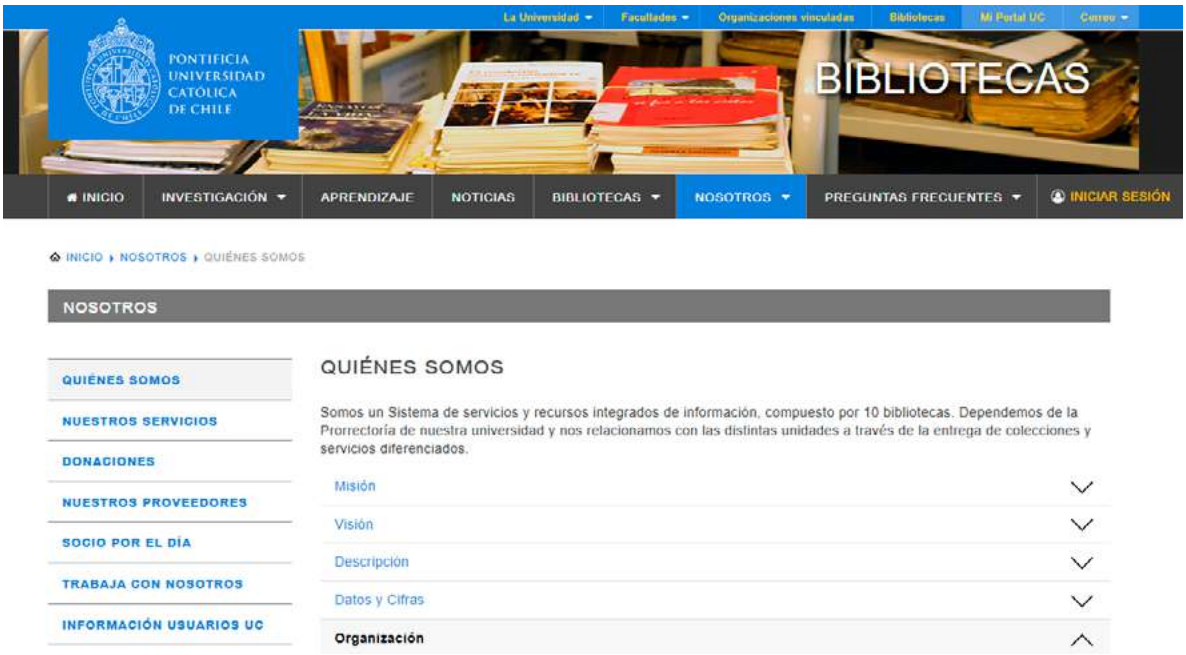
Case 30

NEW STRUCTURES, PROFILES, AND ROLES	
Contributing university	Pontificia Universidad Católica de Chile (Chile)
Project title	Redesign of organizational structure

Brief Description (Abstract). UC Libraries is undertaking the redesign of its organization with the following objectives:

- Align the structure with the strategic goals of UC Libraries, formalizing integration with the key processes of the University.
- Focus the organization on optimizing the user experience.
- Increase flexibility to enhance the speed of response to emerging needs.
- Give prominence and formal recognition to tasks that define the expanded role of UC Libraries and the diversification of services.

URL: https://bibliotecas.uc.cl/nosotros/quienes-somos#organizacion



Case 31

LIBRARY DEVELOPMENT PROGRAMS	
Contributing university	Universidad Católica de la Santísima Concepción (Chile)
Project title	Course offerings for library science professionals
Brief Description (Abstract). The Library System, in collaboration with the Directorate of Continuing Education of the UCSC, has introduced a course titled “Accompaniment in the Scientific Research Process.” This course is specifically designed for library professionals and researchers in Chile and Latin America.	
URL: https://formacioncontinua.ucsc.cl/carreras/curso-de-acompanamiento-en-el-proceso-de-investigacion-cientifica/	

Case 32

LIBRARY DEVELOPMENT PROGRAMS	
Contributing university	Tecnológico de Monterrey (México) Universidad Peruana Cayetano Heredia (Perú) Universidad de Costa Rica (Costa Rica)
Project title	Library Conversations Series Program
Brief Description (Abstract). Its objective is to strengthen learning capacities in order to improve the existing functions of library staff (upskilling), as well as to motivate professional readjustment (reskilling) to acquire new skills for transitioning to new roles in library spaces and services. The initiative is an open space for dialogue and collaboration on best practices in academic libraries: digital collection development, open science, virtual services, digital literacy training, cultural heritage management, and sustainable development goals.	
URL: https://thehuc.org/libraries/training-es http://tiny.cc/huc-library-youtube	

Case 33

LIBRARY DEVELOPMENT PROGRAMS	
Contributing university	Universidad de Bogotá Jorge Tadeo Lozano (Colombia)
Project title	Library Training Week
Brief Description (Abstract). The Library Training Week is a dedicated space designed to strengthen both soft and specialized skills among library teams. It includes training sessions focused on fostering leadership, teamwork, critical thinking, and service excellence. Additionally, through methodologies such as CLIA (Community-Library Inter-Action), design thinking, and Scrum, solutions to real challenges in library management are developed to create impactful new services for the university community.	
URL: www.utadeo.edu.co/es/link/sistema-de-bibliotecas/104046/jornadas-de-formacion-bibliotecaria www.instagram.com/bibliotecasutadeo/p/C8YWpQ0u7BN/?img_index=10	

Throughout this chapter, a collection of Innovation and Good Practices Cases from academic libraries and CRAI participants in this study was presented, providing valuable insights into emerging trends.

Through collection and analysis, the study identified standout experiences in areas such as digital transformation, open science, and enhancing the user experience. These cases reflect higher education institutions' commitment to continuous improvement and innovation in library services. By sharing these innovative practices, the study offers a valuable reference for other institutions interested in initiating or enhancing their library transformations. This contributes to advancing education, open access to information, and culture aimed at improving the academic community's experience.

CHAPTER 4

Conclusions

The report ***Trends in Innovation in Academic Libraries in Latin America and the Caribbean*** highlights the current state of academic libraries in the region compared to international trends. This groundbreaking study involved 222 academic libraries from 22 countries across the region, showcasing the diversity of respondent profiles in terms of location, size, and institutional contexts.

4.1. Key results

- Over the past five years, more than 80% of HEIs in Latin America and the Caribbean have introduced programs in new or interdisciplinary areas of knowledge and have adapted their curricula to meet the demands of digital education. However, only 43.7% of libraries actively participate in the design or development of these new academic programs, and 38.8% are involved in the creation of flexible online programs.
- Learning analytics has become a key strategy for measuring academic success in 54% of the surveyed HEIs. Despite this, library involvement remains limited, with only 27.5% managing dashboards of indicators or statistics that highlight student success and 34.2% actively contributing to initiatives that support student retention.
- The digital transformation of education and the increased flexibility of educational programs in HEIs are driving the growth and demand for digital collections, while the use of physical materials is decreasing to better align with user needs.
- Notably, 73.9% of libraries are involved in initiatives or experiences that promote inclusion and diversity. They also play a significant role in adopting educational spaces (infrastructure) or programs aimed at fostering interpersonal skills and personal development, such as inclusion, equity, leadership, time management, and techniques for reading or studying.
- The significant leadership and active participation of libraries in defining policies, models, guidelines, and institutional strategies for open science is evident. This surpasses the general interest in open science among HEIs, highlighting a promising opportunity for academic libraries. While there is

moderate adoption of practices related to research data management and open educational resources, the development of transformative agreements with publishers remains minimal.

- When it comes to the adoption of emerging technologies—such as blockchain, artificial intelligence (AI), extended realities (virtual, augmented, hybrid, metaverse), or robotics (drones, robots)—libraries in the region appear to be far from ready. In fact, a high percentage of institutions express no interest in implementing these technologies soon. Nonetheless, 60.8% of libraries actively contribute to the adoption of educational innovations by offering spaces for demonstrations, training, or raising awareness within the academic community about new technologies.
- Academic libraries often seem disconnected from or uninvolved in addressing the diversification of HEIs' revenue streams. Their primary focus remains on optimizing allocated budgets, primarily through consortium purchases of bibliographic resources.
- Budgetary constraints are a pressing issue, with more than half of the libraries surveyed (55.41%) reporting significant budget cuts. Among these, 21.62% experienced reductions exceeding 31%. The most affected areas, in order, include printed collections, personnel, digital collections, infrastructure and technology, and operating expenses.
- Libraries report that management and operational tasks consume most of their time, leaving little opportunity to dedicate sufficient attention to implementing change strategies.
- The moderate level of confidence expressed by library leaders in aligning their value proposition with strategic objectives suggests a disconnect between the perceived value of the library and its strategic contribution to institutional priorities. Survey responses highlight high levels of adoption in access to and use of collections, but lower levels of academic impact and user satisfaction, further underscoring this gap.
- With only a small percentage (21.2%) of libraries surveyed reporting an innovative experience or practice, this indicates either a lack of implementation or documentation of specific practices, or a relative disinterest in

sharing library practices. This suggests the presence of significant gaps among academic libraries in the region.

4.2. Limitations

Four main barriers to effective change management in academic libraries have been identified: financial resources (67.1%), resistance to change (46.4%), lack of skills (46.4%), and limited evolution in professional profiles (46.4%). In addition to these primary obstacles, leaders highlighted the following: difficulties in communicating or demonstrating the value of the library/CRAI to other institutional leaders (36.8%); insufficient inter-institutional collaboration with other areas or departments (29.3%); limitations in provider technology (such as inadequate functionality or delays in technological upgrades, 28.8%); labor restrictions (e.g., unions, 18%); and challenges related to flexible or remote work arrangements, cited by only 8.6%.

Financial limitations. This barrier, regarded as the most critical, significantly restricts libraries' ability to implement improvements, acquire new resources, and carry out essential innovations in their services. Limited budgets impact the hiring of specialized personnel and hinder the acquisition of advanced technology, digital tools, and resources for innovative projects.	**Lack of Development in Professional.** Profiles The lack of updating professional profiles hinders libraries' ability to adopt a more active and strategic role in supporting learning and research, as well as limiting their capacity to establish interdisciplinary partnerships within academic institutions.
Lack of skills. Without skills in areas such as the use of digital platforms, the management of electronic resources, the curation of digital content, and the evaluation of academic impact, librarians find it difficult to implement innovative programs and services that respond to the changing needs of the academic community. A lack of skills in data management and library usage metrics analysis, for example, reduces the ability to make informed decisions and maximize the impact of resources.	**Resistance to change.** It represents a significant barrier in the context of academic libraries and can be derived from multiple factors, such as: lack of adequate training, deficiencies in organizational communication, leadership that fails to involve all staff in the vision of change, fear of the unknown, or a preference to maintain the status quo. The priority of maintaining traditional methods and a rigid organizational culture make it difficult to implement innovations.

4.3. Recommendations

Academic libraries in the region face significant challenges in a constantly changing technological, educational, and cultural environment. Therefore, some specific strategies are proposed aimed at strengthening their role as key players in educational innovation and the advancement of knowledge in the region:

- Align the library's value proposition with the institution's strategic objectives.
- Reinvent themselves and take on a leadership role within their institutions, contributing effectively to the processes of teaching, learning, and research.
- Be more effective in communicating their academic impact and assume leadership roles within institutional structures.
- Continue leading actions related to open science and research data management, leveraging the recognition they have gained in this field.
- Transform their traditional human teams into agile, multidisciplinary, and innovative structures, responsive to changes in the environment and the specific needs of their institution.
- Strengthen the links between library resources and student academic success, thus improving the overall impact of the library and reinforcing its role in directly supporting academic performance, through specific tutoring programs or more accessible and targeted educational resources.
- Adapt their strategies to address financial limitations and resistance to change.Fortalecer comunidades de aprendizaje y espacios para compartir las buenas prácticas en la región.
- Invest in digital skills development programs for staff and users.
- Establish strategic partnerships/collaborations with research, innovation, and technology areas to enhance the educational experience, academic success, and access to information.
- Transform traditional bookshelf spaces into learning environments that include technology, with laboratories that encourage creativity, active learning, and the development of interdisciplinary projects.

In conclusion, the authors of this study propose updating the collected data every two years to analyze the results and share the findings with the region, promoting continuous and rigorous monitoring of international educational and technological trends that impact libraries. Colleagues from other geographical areas are invited to conduct similar studies to facilitate a deeper and more diverse understanding of the realities and dynamics in different contexts.

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https://scholar.google.com/citations?user=NcHXfRwAAAAJ&hl

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https://scholar.google.com/citations?hl=es&user=vU6cuqIAAAAJ&view_op=list_works
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Librarian and Bachelor's degree holder in Documentation Sciences from Universidad de Playa Ancha de Ciencias de la Educación, Chile, she also holds a Master's degree in Education with a focus on Administration and Quality Management from the Autonomous University of Chile. With over 20 years of professional experience, she has spearheaded several notable projects, including initiatives aimed at promoting open science and democratizing access to scientific information. Since 2017, she has held the position of President of the Advisory Commission on Libraries and Documentation of the Council of Rectors of Chilean Universities, where she has actively contributed to the development of standards for Chilean university libraries.

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Appendices

Appendix No. 1: Standardized Questionnaire for Survey Application

Latin American Trends Survey

This research survey aims to conduct an exploratory and documentary study of innovation trends, evolution, or transformation of university academic libraries in Latin America, and through diagnosis, identify gaps, challenges, and opportunities. If you have any questions or concerns, contact us at library.group.latam@gmail.com.

The data collected in this instrument will be anonymized and used exclusively for educational purposes. The results of this study will be available under open access with a Creative Commons license (CC BY-NC-ND).

The survey, which consists of seven sections, will be available until June 17 and will take no more than 25 minutes to complete. By participating in this survey, I understand that my identity will be protected, and I voluntarily agree to share the collected data.

If you have any questions or wish to share any messages with us, please send them to: library.group.latam@gmail.com.

Thank you very much for your collaboration.

NEXT

Seleccione el idioma en que quiere presentar la encuesta / Selecione o idioma em que deseja apresentar a pesquisa / Select the language in which you want to take the survey

Select of the following options:

- Español
- Português
- English

NEXT

Full Name:

Academic Institution:

Authorization for use, publication, and distribution. By this means, I declare that the information presented to the LATAM Library Study Group (hereinafter “Grupo LATAM”) respects all moral and property rights of authorship. I authorize Grupo LATAM to make physical and/or electronic storage of the information provided through digital or printed copy to ensure its availability, dissemination, public communication, distribution, transmission, reproduction, as well as its digitization for educational and non-profit purposes. Likewise, it is my wish to establish that this authorization is voluntary and free, which can be revoked at any time if it suits my interests through a request on this site. I acknowledge that I have all the necessary rights and faculties to respond to this authorization. I declare that the informative, educational, literary content, the edition, and in general any part of the documentation presented is my responsibility, so Grupo LATAM is exempted from any violation of copyright and/or intellectual property rights, as well as any related responsibility with third parties.

The data collected will be used exclusively for educational purposes. The results of this study will be available under open access with a Creative Commons license (CC BY-NC-ND).

Select one of the following options:

- I grant license and permission to use information

SECTION 1: DEMOGRAPHIC PROFILE AND CONTEXT

[1] Name of the respondent

*Open field

[2] Position:

*Dropdown list

- Director of the library system
- Campus or site library director
- Library leader
- Library area manager
- Other (specify)

[3] Years of experience in the current position

*Dropdown list

- Less than 2 years
- 2-5 years
- 6-10 years
- 11-15 years
- More than 15 years

[4] Educational level (last academic degree)

*Dropdown list

- Bachelor's degree in information science and/or Librarianship
- Master's degree in information science and/or Librarianship
- Doctorate in Information Science and/or Librarianship
- Other undergraduate/master's/doctoral specialty (specify)

[5] Age

*Dropdown list

- 25-35 years
- 36-45 years
- 46-55 years
- More than 56 years

[6] Gender

*Dropdown list

- Male
- Female
- Non-binary
- Other option not listed

[7] Academic Institutional affiliation (Full Name of the Academic Institution)

*Open question

[8] Country

*Dropdown list

- Argentina
- Bolivia
- Brasil
- Chile
- Colombia
- Costa Rica
- Dominican Republic

- Ecuador
- El Salvador
- Guatemala
- Honduras
- Jamaica
- Mexico
- Nicaragua
- Panama
- Paraguay
- Perú
- Puerto Rico
- Trinidad and Tobago
- Uruguay
- US Virgin Islands
- Venezuela

[9] Sector

*Dropdown list

- Private
- Public

[10] Type of Institution

*Help note; highest degree offered by the institution?

*Dropdown list

- Technical College
- University – bachelor's degrees
- University – master's degrees
- University – doctoral degrees

SECTION 2: ORGANIZATIONAL PROFILE, STRUCTURE AND AUTONOMY

[11] Type of library or information unit

*Dropdown list

- Academic Library (university)
- CRAI - Center for Learning and Research Resources
- Other (specify)_____

[12] Organizational dependency

*Help note: Who does it directly depend on?

*Dropdown list

- Vice-Rectorate or Deanship / Academic Affairs or Academic Director / Provost
- Vice-Rectorate or Deanship of Research
- Vice-Rectorate or Deanship / Administrative or Financial Directorate
- Vice-Rectorate or Deanship of Information Technology/ Technology Directorate
- Chancellor or President
- Other (specify) _____

[13] What is the number of staff (collaborators) in your library?

*Dropdown list

- 0-20
- 21-50
- 51-70
- More than 71

[14] What percentage of the staff (collaborators) in your library have studies in librarianship and/or information science?

*Help note: consider full-time staff working in the library

*Dropdown list

- 0-15%
- 15-30%

- 31-45%
- More than 46%

[15] Approximately what percentage of employees in your library are unionized?

*Dropdown list

- 0%
- 1-25%
- 26-50%
- 51%-75%
- 76-100%

[16] How is the budget managed in your library?

*Dropdown list

- The institution assigns a budget, and its execution is the responsibility of the library director
- The institution assigns a budget, but the director is not autonomous in its execution
- There is no annual assigned budget; authorization must always be requested
- Other (specify)

[17] Has the library had a significant budget cut that has prevented it from meeting library goals or services in the last five years?

*Dropdown list

- Yes
- No

[18] In the last five years, what has been the budget cut or reduction that the library has experienced?

*Dropdown list

- Less than 10%
- Between 11% and 20%

- Between 21% and 30%
- More than 31%

[19] In the last five years, in which areas of the budget has a reduction been requested?

*Multiple choice

- Infrastructure (spaces/technology)
- Printed collections (physical)
- Digital collections (electronic)
- Library staff (payroll)
- Operating expenses
- Other (specify)

[20] Organize the level of operation assigned to the following functions in your library / information unit, with the highest priority at the top and the least priority at the bottom.

*Help note: Drag the functions from the left to the right and drop them according to importance. The exercise ends when all aspects have been organized in the right column.

- Manage educational spaces for learning, study, and collaboration (infrastructure, facilities)
- Design and facilitate training programs, instruction, and/or reference for the development of information handling skills (information literacy)
- Design and facilitate training programs, instruction, and/or reference for the development of research skills
- Development of special collections (documentary and historical material)
- Develop strategies and ensure academic linkage with academic and research departments
- Quality and experience evaluation processes to ensure certifications, accreditations, or guidelines

- Manage the budget for the development of the library collections (i.e. purchases, subscriptions)
- Manage the budget of technologies and enablers to enable library services (i.e. repository, library management system, discovery tool, ILL systems, loan of printed material, etc.)
- Collections management (i.e. circulation, physical and technical processes of materials)
- Cataloging, standardization, and identification of information resources
- Management and/or administration of the institutional repository (i.e. theses, preservation of academic and scientific results)
- Management and/or administration of academic and/or scientific journals (i.e. calls, publication of articles)
- Training and provision of specialized librarians with high-level experience in various topics
- Other academic activities not directly related to the library

SECTION 3: CHARACTERISTICS OF HIGHER EDUCATION INSTITUTIONS (ACADEMIC ENVIRONMENT IN LATIN AMERICAN AND THE CARIBBEAN)

Select those aspects that you consider are present in your institution and mention their degree of development:

ASPECT	Proven Results	Implemented but still without proven results	In process of implementation	In testing	Do not have it
In the last 5 years, has your institution created programs in new areas of knowledge or inter-disciplinary programs?					
Does your institution currently offer flexible academic programs that respond to the new demands of Digital Education (i.e. online, virtual, Hy flex/hybrid or mixed programs)?					
Does your institution have a policy/model/ guideline or strategy for Open Science?					
Does your institution currently have a strat-egy or digital transfor-mation program?					
Does your institution implement learning analytics mechanisms to evidence student academic success?					
Does your institution implement programs related to the user experience/student journey or similar?					
Does your institution implement programs related to the user experience/student journey or similar?					
Does your institution implement programs related to inclusion or diversity?					

[22] Select those aspects related to the participation of the library in institutional strategies and mention their degree of development:

ASPECT	The library actively participates in the initiative	The library participates in the process with other areas of the institution	The library only provides comments or suggestions	The library does not participate
Does the Library participate in the creation of new academic programs in new areas of knowledge and/or interdisciplinary programs?				
Does the Library participate in the process of defining, designing, implementing, or providing feedback on the institutional strategy of new flexible academic programs in digital education?				
Does the library participate in the formulation and/or implementation of an institutional policy/model/guideline or Open Science strategy?				
Does the Library participate in the process of defining, designing, or providing feedback on the digital transformation strategy or program?				
Does the library participate in the implementation of institutional learning analytics mechanisms to evidence student academic success?				
Does the library participate in the implementation of institutional programs related to student success?				
Does the library participate in the implementation of institutional programs related to the user experience/student journey or similar?				

ASPECT	The library actively participates in the initiative	The library participates in the process with other areas of the institution	The library only provides comments or suggestions	The library does not participate
Does the library play an important role in obtaining funds and resources for the financing of educational services and strategies?				
Does the library offer an educational space in its facilities (infrastructure) to showcase, train, and/or raise awareness in the use of new technologies (i.e. virtual reality, artificial intelligence, augmented reality)?				
Does the library facilitate educational spaces (infrastructure) and/or programs that help develop other interpersonal or personal development skills (i.e. inclusion, equity, leadership, time management, reading or study techniques)?				

SECTION 4: ANALYSIS OF ACADEMIC LIBRARY TRENDS

[23] Select those aspects related to trends in academic libraries that are present in your institution and mention their degree of development:

LIBRARY EXPERIENCE	Yes, we have an implemented experience	In the process of implementation	We are in the strategy design phase	Not planned in the short term
Does the library have experiences/services/spaces related to inclusion or diversity?				
Does the library have digital competence training programs?				
Does the library have impact indicators that account for the real contribution to the substantive functions of the Institution?				
Does the library have income diversification programs such as selling products and/or services?				
Does the library participate in any consortium to optimize the bibliographic material purchase budget?				
Does the library participate in the institutional Research Data Management (RDM) strategy?				
Has the library implemented a strategy related to Open Educational Resources (OER)?				
Has the library negotiated transformative agreements (i.e. “Read & Publish” / APCs benefits)?				
Has the library integrated the user experience (UX - CX) strategy into library services?				
Has the library adopted new cataloging schemes (BIBFRAME, linked data)?				
Has the library integrated technological applications such as Blockchain?				
Has the library integrated technological applications such as artificial intelligence (AI)?				

LIBRARY EXPERIENCE	Yes, we have an implemented experience	In the process of implementation	We are in the strategy design phase	Not planned in the short term
Has the library integrated technological applications of extended realities (virtual, augmented, hybrid, metaverse)?				
Has the library integrated technological applications of robotics (drones, robots)?				

[24] Describe your level of agreement with the following statements and your level of agreement with the following statements:

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
My institution appreciates a trend of adopting study plans (academic programs) of information resources in various formats and diverse types of materials (i.e. video, multimedia, audio, virtual reality) beyond textbooks.					
In the next five years, my library will increasingly rely on electronic resources offered externally by different providers.					
In the next five years, my library will increasingly rely on electronic resources produced by my institution and academia.					
In the coming years, libraries will need to deploy a strong strategy to reduce printed material considering the low demand for the printed collection (circulation) versus the high demand for electronic resources in digital collections.					

SECTION 5: Personnel: multidisciplinary teams a new skills

[25] Which of the following knowledge, skills, and competencies have been most valuable to you?

*Multiple-choice answer

- Change Management
- Emotional Intelligence
- Talent Management (HR)
- Communication Skills (i.e. written, oral, interpersonal)
- Strategic Planning
- Administrative and/or Financial Planning
- Agile Methodologies (i.e. design thinking, project management, scrum)
- Innovation and creativity
- Other (specify) _____

[26] Considering the challenges currently faced by your library, mention the status of new roles for collaborators in your library:

ROLES	Yes, already established in the organizational structure	Yes, already established in the job profile	In the process of creation	In the planning process	Not planned to have these functions
Data Librarian					
Teacher Librarian					
Bibliotecario Investigador (research librarian)					
Research Librarian					
Content Curation Librarian					
User Experience Librarian					
Librarian with skills in serving users with different needs (equity, diversity, and inclusion)					

Other (specify) _____

[27] Determine the status and future development for the personnel of your library in terms of the following knowledge, skills, and/or competencies:

COMPETENCES	Yes, I have expert personnel	I have personnel in the training process	I do not yet have it, but I am planning to train personnel in the short term	I do not plan to have personnel with these skills
Research Data Management				
Open Science				
Digital Skills				
Pedagogical/Teaching Competencies				
Artificial Intelligence				
Intelligence artificial				
Immersive Technologies				
Blockchain				

SECTION 6: Library's impact in higher education institutions

[28] Regarding the impact of the library, indicate which measurement mechanism you use most frequently:

*Use the scale of 1 to 5 where 5 is the maximum value and 1 is the minimum value

COMPETENCES	5	4	3	2	1
Statistics of access to digital collections					
Statistics of use/consumption of digital collections (circulation/loans)					
Statistics of use/consumption of printed collections (circulation/loans)					
Library services satisfaction statistics					
Academic impact indicators of the library (retention/continuity)					
Academic impact indicators of the library (student academic performance)					

Other (specify) _____

[29] What level of recognition do you think the Academic Library has within your institution and its highest authorities?

*Use the scale of 1 to 5 where 5 is the maximum value and 1 is the minimum value

	5	4	3	2	1
What is your level of confidence and/or mastery in articulating the value proposition of the library in a way that aligns with the strategic objectives of our institution's leaders?					

SECTION 7: CONCLUSIONS AND CLOSURE

[30] In your opinion, what are the main limitations you have faced in making the desired changes in your academic library?

Select all options that apply in your case (multiple choice)

- Difficulty in communicating and/or demonstrating the value of the library with other leaderships in the institution
- Decrease and/or lack of budget
- Lack of change in librarian profiles
- Lack of skills and/or updating in library staff
- General resistance to change
- Lack of inter-institutional collaboration (with other areas or departments)
- Labor restrictions (i.e. unions)
- Flexible and/or remote work
- Limited technology from providers (lack of functionality and/or technological change for libraries)

Other (specify) _____

[31] Do you think there is an important trend that is impacting academic libraries and has not been addressed in this study?

(We'll appreciate your specific comments)

[32] Do you think your library has any relevant experience and/or good practice that reflects innovation in line with international trends over the last 5 years and that you would like to be published (mentioned) in this study? If your answer is yes, please include the name of the initiative/strategy/project, a summary, and a URL to access the information.

- Yes
- No

If you check yes

*Help note: We'll appreciate your specific comments (title, summary, URL)

*Open answer

Title of experience / good practice:
Summary:
URL where the progress can be observed:

Add another

[33] Would you like to share an additional comment with us?

(We'll appreciate your specific comments)

Thank you, message (upon sending the survey),

Your response has been recorded. Thank you very much for participating in this study, which will allow us to visualize the future of academic libraries in Latin America and the Caribbean. Our commitment is to share the results with you to extend collaboration and development ties.

If you have any questions or wish to share any messages with us, please send them to: library.group.latam@gmail.com.

Thank you very much for your collaboration.

Appendix No. 2: Survey Sample and Representation

COUNTRY	# HEIS (OFFICIAL)	# INVITATIONS (SENT)	# REPONSES (RECEIVED)	SOURCE
Argentina	137	44	26	https://www.argentina.gob.ar/educacion/universidades/informacion/publicaciones/sintesis
Bolivia	64	4	2	https://www.minedu.gob.bo/files/publicaciones/vesfp/dgesu/GUIA-UNIVERSIDADES-2016.pdf
Brasil	2398	27	14	Scielo “La educación Superior en Brasil”, https://www.scielo.br/j/aval/a/mNnpYLKRWrZNbXcJjp9s8Ph/?format=pdf
Chile	58	35	24	https://www.mifuturo.cl/sies/
Colombia	226	95	49	SNIES, https://snies.mineducacion.gov.co/portal/Informes-e-indicadores/Resumen-indicadores-Educacion-Superior/
Costa Rica	164	14	7	https://www.altillo.com/universidades/universidades_costa.asp
Ecuador	85	35	9	https://www.altillo.com/universidades/universidades_ecuador.asp
El Salvador	44	2	2	MINISTERIO DE EDUCACIÓN, CIENCIA Y TECNOLOGÍA (Gobierno de El Salvador); https://www.mined.gob.sv/descarga/instituciones2021.pdf
Guatemala	15	10	2	https://iips.usac.edu.gt/wp-content/uploads/2021/08/Bolet%C3%ADn-6-Universidad-nacional-y-sociedades-mayas-Agosto-2021-IIPS.pdf
Honduras	52	3	3	https://www.altillo.com/universidades/universidades_honduras.asp
Islas Vírgenes Americana	1	1	1	National Center for Education Statistics. https://nces.ed.gov/ipeds/
Jamaica	32	7	2	The University Council of Jamaica. https://www.ucj.org.jm/
México	3269	56	28	SIC México (Sistema de Información Cultural), https://sic.cultura.gob.mx/lista.php?table=universidad&disciplina&estado_id

COUNTRY	# HEIS (OFFICIAL)	# INVITATIONS (SENT)	# REPONSES (RECEIVED)	SOURCE
Nicaragua	58	7	3	https://www.cnea.edu.ni/universidades/todas
Panamá	44	4	4	https://universidades.pa/universidades
Paraguay	54	26	3	https://www.lanacion.com.py/2016/03/29/54-solo-3-universidades-paraguay-figuran-ranking-regional/
Perú	142	74	12	https://www.educaedu.com.pe/centros
Puerto Rico	54	47	13	National Center for Education Statistics. https://nces.ed.gov/ipeds/
República Dominicana	47	26	8	Ministerio de Educación Superior, Ciencia y Tecnología. https://mescyt.gob.do/transparencia/wp-content/uploads/2022/10/DATOS-DE-EDUCACION-SUPERIOR-2021-MATRICULASEGRESADOS-DOCENTES-E-INVESTIGADORES.pdf
Trinidad y Tobago	5	5	2	https://es.uni24k.com/c/trinidad-y-tobago/
Uruguay	64	28	6	https://www.gub.uy/ministerio-educacion-cultura/datos-y-estadisticas/datos
Venezuela	116	14	6	https://www.altillo.com/universidades/universidades_venezuela.asp
	7129	**564**	**226**	

Appendix No. 3: Glossary of Trends

- **Academic Library:** A library whose primary function is to meet learning and research information needs. This category includes libraries in schools and higher education institutions, as well as general research libraries (American Library Association, 2022; International Federation of Library Associations and Institutions [IFLA], n.d.).
- **Agenda 2030:** Refers to how library activities and services contribute to the United Nations' Sustainable Development Goals (SDGs), fostering a positive impact on education, equality, and sustainable development at a global level.
- **Budget and Resources:** Involves the management of financial resources available to libraries, including budget planning, fund allocation, and expense management to ensure the sustainability and efficiency of library services.
- **Community engagement:** Encompasses the social activities carried out by the library, such as workshops, cultural events, recreational activities, and outreach programs that encourage active community participation.
- **Human resource management:** Encompasses concepts related to staff recruitment and development, workplace climate, professional training, and defining the necessary professional profiles to optimize performance and satisfaction within the library work environment.
- **Implementation of new technologies:** Addresses the integration of emerging technologies in libraries, such as artificial intelligence (AI), technology labs, virtual classrooms, and other advanced technological resources that enhance service offerings and access to information.
- **Management of bibliographic resources:** Covers aspects related to the administration of both physical and digital collections, including their acquisition, cataloging, preservation, and organization. It also involves evaluating the quality and relevance of resources to ensure they meet users' needs.

- **New learning methodologies:** Focuses on the adoption of innovative and diverse approaches to facilitate learning, such as project-based methods, collaborative learning, and adaptive teaching strategies that cater to users' individual needs.
- **Transformative agreement:** Transformative agreements are identified as contracts negotiated between institutions (information centers, libraries, national and regional consortia) and publishers aiming to transform the underlying business model of academic publishing. This transformation shifts from a pay-to-access (subscription-based) model to one aligned with open access (European Science Foundation, n.d.). Transformative agreements are being used as instruments to accelerate the transition to open access (Anglada et al., 2020).
- **User profile transformation:** Addresses the rapid and dynamic changes in the expectations and behaviors of library users, prompting library professionals to adapt their work methods and services to meet these evolving demands.

Appendix No. 4: Scientific and Technological Trends in Academic Libraries in Latin America

Report on technology monitoring led by Universidad Nacional de Colombia

Ángela María Benítez Góez; Astrid Girlesa Uribe Martínez; Paola Andrea Restrepo Mazo and Sonia María Valencia Grajales. https://repositorio.unal.edu.co/handle/unal/87214

Introduction

University libraries and higher education institutions have evolved in alignment with technological advancements and social changes. While they maintain their core functions, they now offer both basic and specialized services in hybrid environments that foster individual and collaborative learning. These spaces serve as academic and social hubs, facilitating research and teamwork. However, there have been radical shifts in the use of media, technologies, and platforms for information access, now driven by the Internet of Things, data mining, artificial intelligence, and other innovative technologies.

This report presents the results of a scientific and technological analysis aimed at identifying trends in education and libraries in Latin America based on search results from various information sources. This process involves multiple phases, including the selection of terms and information sources, the formulation of search equations, information retrieval, and analysis.

One of the primary objectives is to track and examine emerging and updated trends in the scientific literature related to higher education and academic libraries. Additionally, it seeks to explore technological tools and patents to assess the existence of technological developments that may indicate trends in these fields. Based on the findings, the report aims to infer conclusions, key insights, motivations, or drivers that can support decision-makers in university libraries.

Methodology

Through an extensive exploration and search within the world's leading scientific and technological databases—such as Scopus, Web of Science, Patentscope, Espacenet, Latipat, and Lens—key terms and keywords were selected to construct search equations that would yield relevant results for the core topics: education and libraries. Once the search results were obtained, a data-cleaning process was carried out to identify relationships, associations, patterns, and correlations between keywords and abstracts. Finally, an in-depth analysis was conducted to deduce trends based on the findings identified in the documentary information sources.

Emerging Trends in Academic Libraries: A Look at Digital Transformation

Libraries as a driving force in shaping the future of innovation in education.
(Marty, 2022)

Scientific Review

Emerging Trends in Academic Libraries

In the current era, academic libraries are undergoing a phase of digital transformation, a process that has been significantly accelerated by the COVID-19 pandemic. This transformation extends beyond the mere adoption of emerging technologies; it also involves the redefinition of competencies and the implementation of innovative strategies to ensure their continued relevance in an ever-evolving educational landscape.

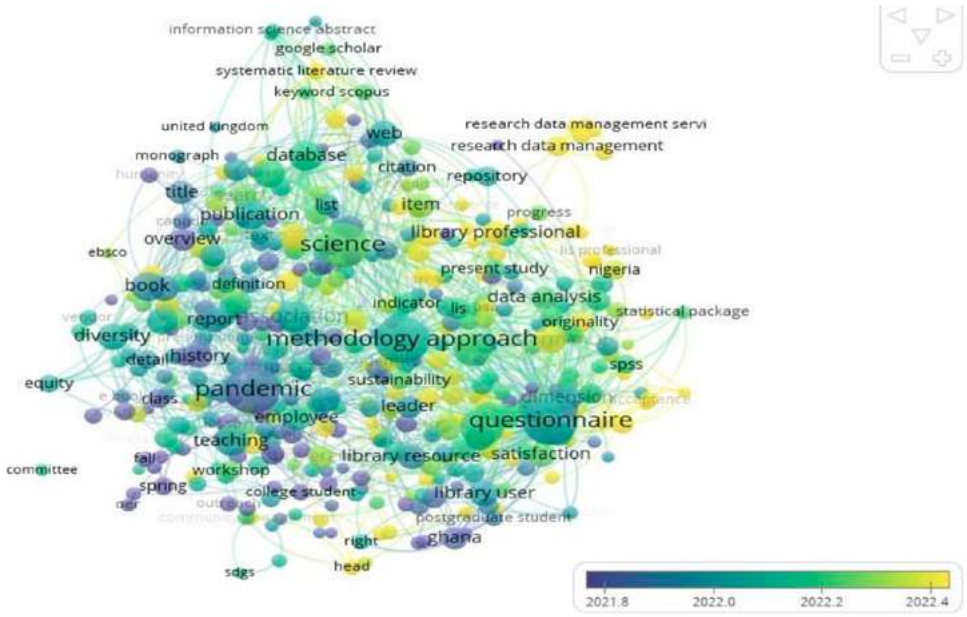


Illustration 1: Main research themes
Source: Created by the author in Vosviewer.
Figure of term co-occurrence extracted from the keywords in the documents.

The analysis of the 1,346 records, resulting from the review of the scientific literature over the past three years, allows us to infer that the reported trends focus on:

Widespread awareness of AI and its benefits

AI is seen as a potentially useful tool in libraries. It is perceived as an ally to automate tasks and enhance information services and management. This trend emphasizes the importance of efficiency and service improvement in libraries, including routine tasks, research support, and library management.

There is significant optimism regarding AI's potential to enhance the capacity and performance of libraries. The innovation strategy, guided by business theories such as the Competing Values Framework (CVF) and the theory of disruptive innovation, is presented as essential to maintaining relevance in the face of technological disruptions.

Haptic technology is also identified as a tool to improve services in libraries from an innovative perspective, offering users more engaging and inclusive services for all types of populations.

Some articles detail experiences in the implementation of virtual reality classrooms and how libraries can expand their services to immersive educational experiences, from acquiring funds and space to selecting technology and designing the classroom. Similarly, the importance of digital literacy and the adaptability of libraries to new technologies continues to be highlighted, offering a valuable resource for both learning and teaching.

Research Data Management (RDM)

This trend was identified from the number of related articles and is essentially based on how data management is redefining the role and identity of academic libraries and librarians. Through a thorough analysis of the existing literature, it explores the impact of RDM initiatives on the perception and value of libraries within their educational institutions. The need to develop skills and competencies in RDM among librarians is emphasized, and the dynamics of collaboration and competition that arise in this context are discussed.

Transformative agreements and agile leadership

Another trend detected in the literature discusses the importance of transformative agreements, which are changing the dynamics of academic libraries, pushing them toward a more open and equitable future. The authors address the need for strategic adaptation and agile leadership to navigate a constantly changing environment, emphasizing the importance of collaboration and innovative development to overcome the financial and cultural challenges introduced by open access (OA).

The adoption of agile strategic management models is also required, along with the need for a dynamic approach to strategic planning that includes continuous feedback and adaptation to changing needs. This highlights the importance of inclusion, employee empowerment, and the consideration of critical management studies to ensure participation and engagement at all levels of the organization.

Technology review

According to the following search equations: “Universit* librar*,” “University Libraries,” “University Library,” “university library” - Years 2010-2024, applied in different patent databases, primarily analyzing results obtained in Patentscope and Espacenet, the following technological trends over the past 5 years are identified. These trends show that methods, systems, devices, and platforms are being patented, marking trends in university libraries, as shown below:

Source: Created by the author, search data from Espacenet and Patentscope.

In this word cloud, it is evident that technologies related to university libraries are being patented, covering various types of shelving and management systems, such as smart shelves, rotating shelves, portable shelves, book collection and organization devices, among others.

On the other hand, patents are also being filed for intelligent management systems and methods, data transmission systems, digital resource sharing, self-checkout and book return systems, personalized services based on Big Data, and other technologies such as artificial intelligence and blockchain. Patents are found for the construction of user portraits for university libraries based on binary k-means of multiple views, data integration and mining to generate user portrait systems and book recommendation systems based on levels of interest. Additionally, patents for smart access control devices and technologies to ensure security, such as entry guards for libraries, are also evident.

Applicants

The top 10 main applicants and their number of patents are as follows:

NAME AND NUMBER OF PATENTS ON THE TOPIC			
	University Nanjing Information Science & Tech *10 patents*		Univ Zhejiang Media & Communications *9 patents*
	Hangsha Kaiya Electronic Tech Co Ltd. *6 patents*		Leeleds Lighting Xiamen Co Ltd. *6 patents*
	Univ North China Science & Technology *6 patents*		Univ Wuhan *6 patents*
	Univ Anhui Science & Tech *5 patents*		Univ Northeast Agricultural *5 patents*
	Univ Yulin Normal *5 patentes*		Shenzhen Polytechnic *4 patentes*

Source: Created by the author based on search results

Countries

The main countries and organizations patenting technologies for university libraries are China, the United States, WO – WIPO, Australia, and countries in the European Union, among others.

Source: Created by the author based on search results

Conclusions and Findings

Through the analysis of the search results, the following conclusions and findings can be inferred, showing the technological trends in university libraries:

1. Emerging Trend in Smart Libraries: There is a trend in the patenting of technologies aimed at the development of smart libraries, where applications of Big Data, Artificial Intelligence (AI), sensors, and the Internet of Things can contribute to university libraries having book recommendation systems, automated cataloging, and enhanced resource search, staying at the forefront of services, administration, and management.
2. Influence of Emerging Technologies: The field of university libraries is influenced by emerging technologies such as blockchain and AI, which are

transforming various administrative functions and service delivery in these information units. In this regard, the incorporation of AI with chatbots in the websites of libraries to assist users with their questions and inquiries is evident.

3. Advanced Automation Using AI: University libraries are also leveraging advanced automation through AI to perform tasks such as extracting, organizing, and returning physical materials. Patents show the creation of robots capable of scanning shelves to identify disordered, lost, or missing books, facilitating the generation of reports.
4. AI and Big Data Developments: Technological developments based on AI and Big Data are evident, which can help university libraries enhance their management and ability to recommend information in both digital and printed formats. Automating cataloging and inventory management tasks, improving information retrieval, and offering personalized training programs based on user requirements and needs are some of the potential benefits.
5. Technological Innovations for User Comfort: In general, the development of new technologies aimed at improving user comfort in university libraries is evident, such as innovations in shelves, desks, chairs, boards, and other furniture. Some inventions refer to shelves or accessories specially designed to store and hold books, as well as other types of furniture used in these libraries.

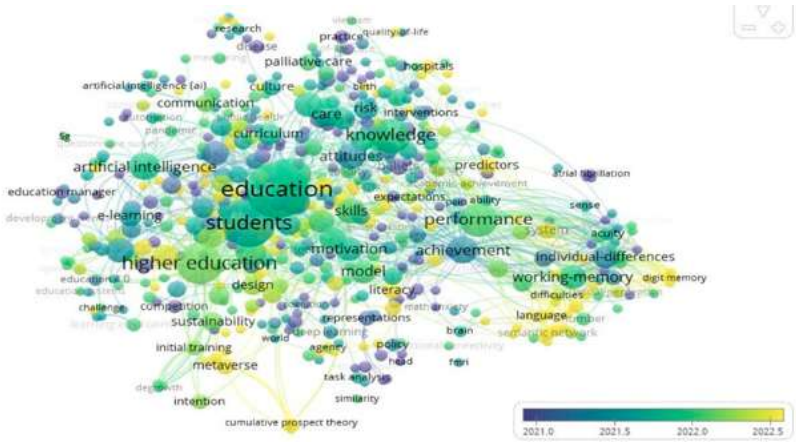
Emerging Trends in Higher Education: Integration of Technology and New Methodologies

Scientific Review

Current trends in education, reflected in various studies and educational models from Latin America and around the world, emphasize the imperative adaptation of educational systems towards more flexible, technologically integrated, and future-oriented approaches. These models highlight the inclusion of digital competencies, critical thinking, and the importance of preparing global citizens for multidisciplinary and multicultural challenges. The integration of tools such as Big Data, IoT, and blend-

ed learning platforms, as well as micro-learning, reflects a movement toward more personalized and adaptive education systems. These approaches aim to improve not only access and quality of education but also its relevance in response to the ever-evolving demands of the labor market.

Illustration 2: Highlighted Technologies and Methodologies



Source: Created by the author in Vosviewer.
Co-occurrence diagram of terms extracted from the keywords in the documents

Highlighted Technologies and Methodologies: Higher education is undergoing significant transformations, driven by the integration of technologies and the adoption of new methodologies. The analysis of recent research highlights two key trends: the growing use of Flipped Learning and the adoption of metaverse-based platforms to enhance learning. These trends not only improve the learning experience but also foster students' intrinsic motivation.

Metaverse Platforms: Immersive virtual environments that enable three-dimensional educational experiences.

Associated Technologies: Virtual Reality (VR), Augmented Reality (AR), and simulation technologies.

Impact: Transforms higher education by creating collaborative virtual environments, enhancing participation and comprehension.

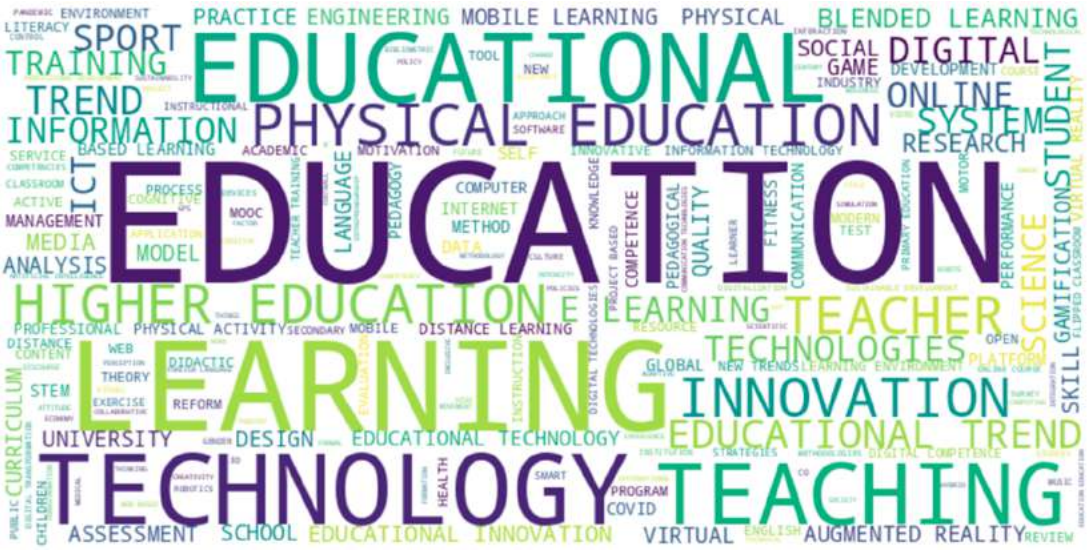
Flipped Learning: A pedagogical approach where students review content before class and use class time for practical activities.

Associated Technologies: Online platforms, educational videos, and gamification tools.

Impact: Promotes student autonomy and satisfies basic psychological needs, strengthening intrinsic motivation.

Hybrid Education:

It is characterized using AI-powered chatbots integrated into educational processes as tools to enhance student learning. These chatbots also suggest a shift in the dynamics of teaching and learning processes, presenting new challenges for educators.



Created by the author using VantagePoint. Word cloud

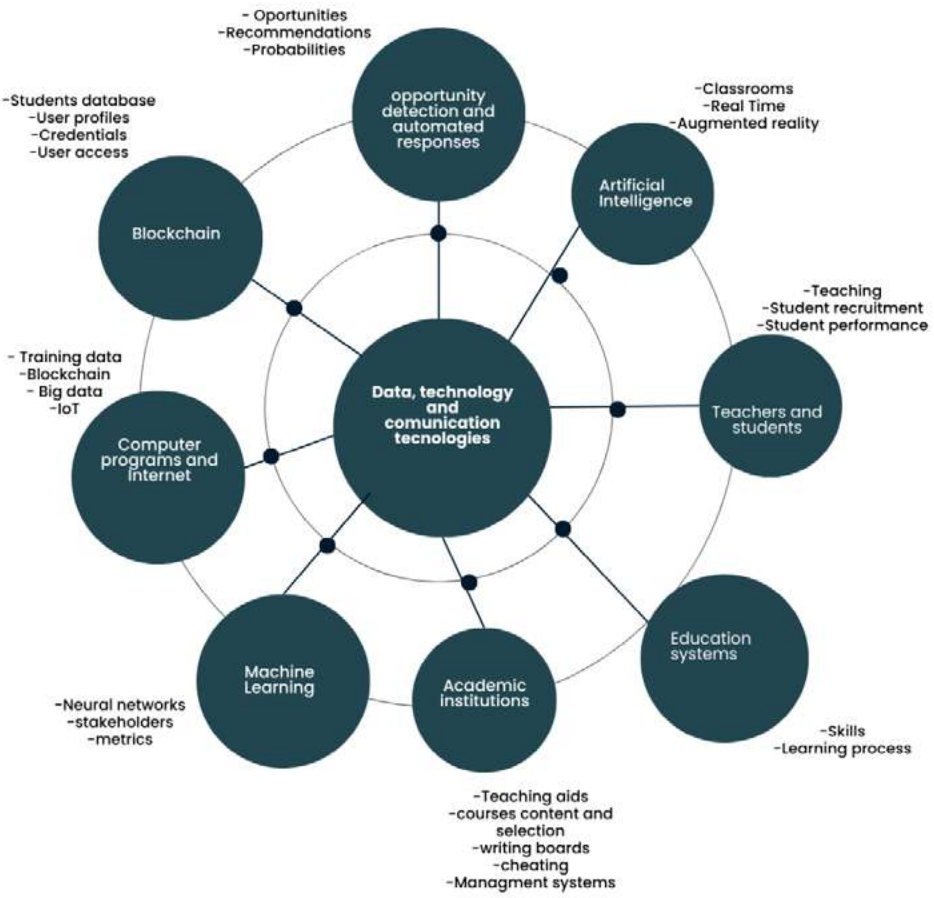
This visualization highlights the most frequent keywords, providing a representation of the topics and concepts that are prominent in the publications related to the included education content. The larger words in the cloud are those that appear most frequently, indicating their relevance in the dataset.

Technological Review

Upon exploring the dataset, the following findings emerge:

- Many inventions propose processes ranging from data collection and processing to potential outcomes, usually related to selecting a subject or situation “A” based on characteristics inputted into the system.
- The goal is to match lists of characteristics or situations with users (consumers) based on their demographic data and preferences, specifically related to content recommendation.
- Use of Blockchain technology for maintaining a reliable and up-to-date student database.
- Predictive analysis for student relationships and improvements. Various aspects of student performance are considered as inputs, the effects of these inputs on performance are monitored, and if any corrections are needed, mentors are informed for necessary adjustments.
- Teaching and measurement materials for university or higher education laboratories, with the possibility of performing various demonstrations and changing conditions for conducting experiments and tests while visualizing the results obtained.
- Cloud computing and blockchain technologies to maintain an accurate and up-to-date record of student and other system users’ information.
- Augmented reality learning devices powered by Artificial Intelligence (AI).
- Technologies to predict students’ learning behavior.

These results are analyzed through a Concept Grid with the goal of identifying sets of terms (concepts) that appear together in multiple records of the analyzed dataset, aiming to uncover trends and patterns.



In this network, built based on the concept grid, which shows the interconnection between all the elements of the concept grid, terms related to higher education and technology appear, such as *learning management systems* and *educational systems*. Terms related to the educational process are also mentioned, such as *students*, *teachers*, *classroom*, and *teaching aids*. Additionally, terms related to the classroom and real-time teaching are highlighted, showing a significant focus on *skills*, *recommendations*, and *opportunities* in the educational field.

Furthermore, emerging and enabling technologies such as blockchain, Artificial Intelligence, neural networks, and IoT (Internet of Things) appear, directly related to educational processes.

Based on the above, several relationships can be identified:

1. **Integration of Technologies:** A significant integration of technologies like Machine Learning, Neural Networks, and Artificial Intelligence is observed in this context, applied across various areas, including course effectiveness, learning opportunities, personalized recommendations, and automated responses.
2. **Relationship between Effectiveness, a Highlighted Feature in Various Patent Documents, and Learning Improvement:** Emphasis is placed on the effectiveness of courses and learning processes, as well as the enhancement of the classroom experience. This is reflected in different devices, methods, and techniques described to optimize student performance and teaching methods.
3. **Connection between Technologies and Educational Elements:** The identified technologies are associated with elements of the educational environment such as classrooms, courses, real-time online activities, and institutional educational systems. This indicates an integral interaction between technology and traditional educational environments.
4. **Emphasis on Personalization and Recommendations:** Concepts like personalized recommendations and opportunities appear, which can be inferred as a focus on learning personalization and support for students› individual needs.
5. **Importance of the Internet and Connectivity:** The Internet is highlighted as a fundamental component, linking various technologies and educational elements. This underscores the importance of connectivity and digital infrastructure in the context of higher education.

In general, these datasets reveal a combination of terms related to higher education, educational technology, and emerging areas such as machine learning and artificial intelligence. The datasets appear to be focused on aspects such as educational management, the effectiveness of the learning process, and the use of technologies to enhance education.

Conclusions:

Based on the search results related to academic libraries, the following conclusions can be drawn: The adoption of artificial intelligence (AI) in academic libraries reflects an evolution in the competencies of library staff toward a more technological and analytical approach. This shift presents significant challenges in the perception of the library profession, emphasizing the need to redefine its role in the digital era. The diversity of approaches to AI adoption highlights the complexity of strategic decisions and the importance of carefully considering the most suitable strategy for each institution.

In terms of technological advancements, it is evident that new developments and innovations are enabling university libraries to adopt technology-driven strategies to improve their services and adapt to changes in the environment. These technological developments highlight trends toward digital transformation, data management, the implementation of digital libraries, smart libraries, collaboration with other institutions, relationships with suppliers, and communication and interaction with users.

Ultimately, academic libraries are undergoing a rapid digital transformation, with artificial intelligence playing a pivotal role. The combination of updated competencies, innovative strategies, and adaptability is essential to ensure that libraries not only survive but thrive in an ever-evolving educational landscape.

In education, the transition towards hybrid educational models, which combine in-person teaching with digital and online elements, reflects a recognition of the diversity of learning styles and the need to develop critical digital skills. This holistic approach to education, which also emphasizes sustainability, equity, and inclusion, marks a significant step toward preparing students to effectively contribute to the future global society. The implementation of open interoperability frameworks in educational systems underscores the urgency of creating learning ecosystems that are accessible, flexible, and capable of adapting to the changing needs of both students and educators, laying the foundation for an education that transcends the traditional classroom barriers.

Appendix No. 5: Key Challenges and Opportunities in Academic Libraries

Report on Key Challenges and Opportunities led by Tecnológico de Monterrey in Mexico, and Pontificia Universidad Católica de Chile:

J. Vladimir Burgos Aguilar and Evelyn Didier Carrasco

Academic libraries face significant challenges in a constantly evolving technological, educational, and cultural landscape. At the same time, they have opportunities to adapt, innovate, and play a key role within their institutions by contributing to teaching, learning, and research.

"Three clear trends can be observed in academic libraries:

- *Serving as a reference point for adopting and sharing new technologies, integrating digitally enriched educational spaces.*
- *Facilitating user-centered digital learning experiences (UX+CX).*
- *Supporting the evolution of higher education institutions through the adoption of a Digital Education strategy."*

Academic libraries have a significant opportunity to evolve and strengthen their role by enabling digital education as a central hub for learning, teaching, and research resources. This involves recognizing the importance of enhancing information resources in synergy with educational processes through digital learning experiences.

Challenges:

- Evolving needs and demands of users
- Constantly changing educational landscape

- Adoption of open access/open science
- Data management and utilization for decision-making
- Collections: copyright, access, and preservation
- The educational space left by printed books in libraries
- Qualified and diverse professionals/new roles in the librarian profile
- Planning for new technologies and emerging uses
- The perceived value of libraries and its impact on budgeting

Opportunities:

- Emerging educational technologies
- Information, digital, and artificial intelligence literacy
- Personalization of services and resources through technology
- Promotion of diversity and inclusion
- Interorganizational collaboration and convergence

The role of the academic library in digital education

The evolution of education in recent years has been highly demanding and has progressed at an accelerated pace through the use of digital technologies, with the internet serving as a key catalyst. Nearly 30 years ago, in 1996, Bill Gates—one of the most influential figures in technology and internet evolution, and the founder and CEO of one of the most transformative companies of the time—wrote an essay in which he coined the phrase “Content is King.” This statement aimed to predict a trend that would shape business models on the internet in the years to come (Gates, 1996).

Gates recognized that one of the greatest opportunities for success in digital media on the internet would be based on the production and distribution of high-quality content, where the most impactful service models would leverage the medium as a conduit for delivering information and entertainment. In his book The Road Ahead (Gates, 1995), he provided insight into this future by detailing his vision of enhancing education through the use of technology.[2]

In recent years, it has become evident that Gates’ prediction not only pointed to the information service model but also envisioned technology as a low-cost catalyst and enabler through the internet—serving as a distribution channel with the potential to reach people on a massive scale (Gates, 2023). The provision of education through electronic media is conceived as digital education, a strategy with the potential to create a large-scale positive impact on society by closing gaps

2 Image generated by Artificial Intelligence with DALL·E 3 model https://easy-peasy.ai/ai-image-generator/images/modern-offshore-development-center-digital-landscape-marvel

in access to quality information and opening new opportunities for development and well-being.

Digital education can be understood beyond virtual or distance learning. It encompasses innovation and digital technologies to advance teaching and learning processes. UNESCO defines it as an opportunity to connect people and resources worldwide to enrich and transform education through digital technologies (UNESCO, 2024b). According to the European Commission, in its *Digital Education Action Plan 2021-2027*, the digital transformation of education has the potential to fully support the educational agenda while enabling inclusive and high-quality training for all students. It facilitates a more personalized and flexible education, fostering a student-centered learning experience (European Education Area, 2020).

n addition to supporting the institution's educational model, the library can contribute to educational transformation through its digital collections. As a platform that embraces a student-centered experience, it has the potential to engage, inspire, and impact the learning process. Digital collections serve as a central pillar in teaching and learning processes, enhancing access to knowledge and fostering a more dynamic and interactive educational environment.[3]

Certainly, the development of the internet has placed significant pressure on libraries, sparking debate over their role, as access to information—including content and materials once restricted to physical, in-person formats—has become widely available to anyone with an internet connection through the World Wide Web (WWW). The control that libraries once held has shifted to users, as the location of information is no longer relevant.

For instance, if a student needs ten articles (information resources) for an academic project and can retrieve them directly from the web, it becomes irrelevant that the library holds hundreds or even thousands of relevant articles. What matters is that the student has fulfilled their information need, obtaining everything required with less effort and in less time (Lewis, 2004). The convenience of access outweighs

3 Image generated by Artificial Intelligence with DALL·E 3 model
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considerations of functionality or reliability, which helps explain why academic libraries have lost many users or struggle to persuade them to utilize the digital collections they offer.

In this digital evolution, libraries have the opportunity to become a key reference point for users by sharing relevant digital resources in various formats, as well as providing access to new technologies and training in their use. A report published by PressReader, titled *What Industry Leaders Predict About the Future of Libraries*, surveyed library teams worldwide about their experiences and perspectives on the future of libraries in strategic areas. With responses from 69 countries—40% from public libraries and 34% from academic libraries—the study explored the impact of emerging technologies on libraries and education, with a particular focus on blockchain and artificial intelligence.

According to the **Center for the Future of Libraries** (2017), an initiative sponsored by the American Library Association, academic libraries serve as a natural platform for showcasing new technologies and can play this role in advancing virtual reality (VR). This suggests that academic libraries, as interdisciplinary educational spaces for collaboration and connection, have the capacity to facilitate educational experiences with emerging technologies through the process of information discovery. By integrating game-based strategies, learning models, and research frameworks, libraries can enhance the value of information resources through a sustained strategic relationship with academic engagement (Patterson et al., 2019).[4]

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The Academic Library: A Laboratory for New Technology-Enriched Educational Spaces

Historically, academic libraries have provided a space within educational institutions to facilitate access to high-quality, reliable, and otherwise hard-to-obtain information due to various factors, including economic constraints. Additionally, they have served as innovation labs, fostering research and learning. As the world continues to evolve, the design and function of libraries must also adapt. Academic practices and scholarly outputs have undergone significant transformations, influencing not only information access needs but also the demands for instruction and skill development.

For instance, educational spaces within libraries are undergoing transformation and evolution, driven by the growing trend of reducing physical collections. As shelves that once housed books and other printed materials are removed, more space becomes available for new uses. In fact, sustained growth in the development of digital collections is projected (Lewis, 2007; 2016; 2019). The evolution of the academic library entails a transformation of its services, collections, and holdings, consolidating a hybrid model of information services. This model integrates both physical spaces (infrastructure and facilities) and virtual spaces (digital infrastruc-

ture), enabling access to information and user support through online platforms and internet-based services.[5]

It is evident that educational spaces within libraries have undergone a shift in purpose in recent years, affecting buildings and facilities. As mentioned in the previous paragraph, this transformation is partly due to the reduction of physical collections and their conversion into digital repositories and databases, which offer more convenient, efficient, and remote access. Moreover, libraries hold a privileged position within educational institutions, often located at the heart of campus life—a designation that intentionally acknowledges their presence and role in managing the intellectual output of academia. They also represent one of the most significant infrastructure investments and valuable institutional assets. This dynamic has placed considerable pressure on educational institutions to maximize and optimize every square foot of space for its highest and best use. As a result, there has been a critical reassessment of spaces occupied by printed materials that are rarely used or circulated (Carlson, 2022).

The reconfiguration of educational spaces within libraries has sparked a wave of renovation plans and new construction projects across educational institutions, aiming to transform libraries into dynamic hubs where ideas, creativity, innovation, study, and research converge (Hickerson et al., 2022). This transformation presents a unique opportunity for libraries to serve as catalysts for educational experiences that align with institutional teaching and learning strategies. Libraries are increasingly becoming the first point of contact with emerging educational technologies, providing the academic community with access to tools that might initially seem intimidating. By offering a trusted learning environment with simulated trials in a controlled setting, libraries facilitate exploration and adaptation to new technologies while ensuring immediate access to information resources within the same knowledge center (Carlson, 2022). A notable example of this is the use of virtual reality (VR) in libraries (Figueroa, 2018; Kroski, 2021).[6]

5 Image generated by Artificial Intelligence with DALL·E 3 model
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6 Image generated by Artificial Intelligence with DALL·E 3 model
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It is evident that libraries worldwide are investing not only in digital collections—reflected in the steady growth of electronic resource adoption over the past 20 years, with large academic libraries allocating up to 80% of their budget to this area (Breeding, 2023; ARL, 2018)—but also in technology-enriched educational spaces designed to enhance learning. In this context, libraries are evolving into technology-enriched educational environments (Carlson, 2022; IFLA, 2023).

Technology-enriched educational spaces foster active learning by creating interactive teaching environments where participants not only engage in an educational experience but also contribute to problem-solving by identifying new challenges and opportunities. This approach enhances collaboration and the co-construction of meaning (Lozano & Burgos, 2007). Libraries have the opportunity to integrate information and communication technologies (ICTs) as an educational strategy, transforming traditional spaces into dynamic learning environments. In these settings, users can access traditional information resources, such as printed materials in various formats—including books, monographs, journals, and newspapers—while also exploring new technology-enhanced learning experiences. These include digital learning environments that facilitate the consumption of information in innovative formats, such as immersive video (360°), interactive multimedia (3D), and extended reality applications (virtual and augmented reality).

The *NMC Horizon Report: 2017 Library Edition* (New Media Consortium, 2017) highlights the integration of technologies designed to enhance new ways of consuming information, such as video and virtual reality. In this context, libraries must continuously update their policies and services to adapt to the emerging realities and evolving user needs. Individuals increasingly expect to learn and work from any location without spatial limitations, with constant access to learning materials tailored to their specific demands. The adoption of information and communication technologies (ICTs) and

the proliferation of always-connected digital devices have introduced greater flexibility in how, when, and where people engage in learning and research.[7]

The Academic Library: An Educational Experience Beyond Collections

The library service model, as a central hub for managing academic support information resources, must expand its vision to provide a platform that prioritizes the student educational experience. Academic libraries face increasing pressure to demonstrate their impact on student experiences while also showcasing their contribution and value to the educational institution. The value of academic libraries can be demonstrated in various ways (Oakleaf, 2010; Brown & Malenfant, 2016):

- Library services and collections as a factor in student success
- Library services and collections as a factor in student retention and academic continuity
- Library services and collections as a factor influencing the learning process and students' academic performance.

Additionally, it is essential to measure user satisfaction levels and the success of initiatives that integrate technology with an educational purpose. To a large extent, the value of these initiatives lies in user perception, including the educational benefits and advantages promoted by an institution through its educational model (Burgos-Aguilar & Lozano-Rodríguez, 2010). The integration of ICTs in libraries requires a strong focus on user experience (UX + CX), which refers to the quality of interactions an individual has with a product or service. These interactions shape a set of perceptions that determine overall satisfaction, encompassing factors such as effectiveness, efficiency, and the emotional response to the interaction (Walton, 2015).

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While user experience (UX) is commonly used to assess interactions with technological artifacts such as websites and mobile applications, the same usability principles can be applied to both physical and virtual library spaces and services (Priestner & Borg, 2016; Priestner, 2023). On the other hand, customer experience (CX) is a broader concept that encompasses the user's overall experience every time they interact with a service. It refers to a process that identifies activities linked to the service promise, helping organizations focus their efforts, energy, and resources on delivering superior experiences and real value from the user's perspective (McKinsey, 2022). The combined approach of "UX + CX" enables libraries to enhance the experience for students, faculty, researchers, and other members of the academic community. Given that UX is a subset of CX, UX specifically addresses the interaction between the user and a product or service, while CX encompasses the entire user journey, including all touchpoints with the service or product.[8]

It is evident that libraries are striving to enhance the user experience by adopting new technologies that simplify library services, reducing technical complexity while improving the discovery and retrieval experience in search interfaces (Breeding, 2023). Additionally, international events bring together librarians from around the world to explore and integrate UX design and research methods. These initiatives aim to deliver more relevant and user-centered services, ensuring that library offerings align with the evolving needs of their communities (UXLibs, 2024).

One of the most significant challenges facing academic libraries as they evolve and reorganize around user-centered models is the need to shift their strategy away from a collection-centric approach, as the two are fundamentally incompatible (Evans &

8 Image generated by Artificial Intelligence with DALL·E 3 model
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Schonfeld, 2020). The core mission of an academic library is to support and align with the educational and research objectives of its parent institution. This means that academic libraries must redesign and align their services, as well as their print and digital collections, to fulfill institutional priorities and meet users' information needs. This new approach also applies to educational spaces, requiring libraries to shift their focus from prioritizing collections to maximizing their impact on the academic community. By fostering educational experiences and facilitating collaborative, study, and connection spaces, libraries can emphasize a student success-oriented model that places academic achievement at the forefront (Hickerson et al., 2022).[9]

Finally, it is essential to highlight that academic libraries must become more agile and embrace change to make timely decisions. Additionally, they need to communicate effectively and present change proposals to institutional leadership, clearly demonstrating the benefits, potential impacts, and expected improvements in the educational experience (IFLA, 2018). While reflection and prior analysis are valuable, libraries face the challenge of navigating uncertainty and acknowledging that not all decisions can be based on complete data. They must be willing to innovate, adapt, and occasionally encounter setbacks—viewing these experiences as opportunities for learning and continuous improvement.

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