



# Building Capacities in Open Knowledge: Recommendations for Library and Information Science Professionals and Schools

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The impact openness to knowledge is having, not only in the Higher Education (HE) sector but at the public and institutional policy level, is largely due to the efforts of information professionals and researchers, and thanks to these two groups, initiatives such as open access (OA), open education (OE), and open science (OSC) have changed the way in which research is being taught, conducted, and communicated. Openness is a way to democratise access to knowledge developed through public funds, and this movement has been led by informational professionals worldwide; however, we have observed that to a large extent, professional development in different areas of openness is rather self-taught, informal, mentored, or continuous, but not formalised in information science, documentation, or scientific educational programmes. In this exploratory research, we gathered evidence on how (or if) openness to knowledge is being taught by reviewing a series of syllabi from undergraduate and postgraduate programmes in Library and Information Science (LIS) schools sampled from universities that either (a) are leading the agenda in OA, OSC, or OE; or (b) have policies in OA, OSC, or OE; or (c) have national/federal mandates, policies, or regulations regarding OA, OSC, or OE and also from a range of non-formal and/or lifelong learning training programmes offered in these same three areas. We found that while LIS schools are not providing formal training to gain skills and competencies in openness, their libraries are offering different kinds of training in this respect. On the other hand, the good intentions and openness awareness of policies have not yet materialised in actions to ensure capacity building. Research implications aim to influence the development of capacity building in open knowledge, by providing solid evidence for enhancing curriculum advancement in LIS schools and by proposing some recommendations in this direction.

**Keywords:** open Knowledge, Library and Information Science (LIS) schools, information professionals, LIS curriculum, capacity building, policies, open science, open education

## INTRODUCTION

Librarians are amongst the key catalysers in fostering openness in the HE sector alongside educators, learning technologists, and researchers, as their role goes beyond platform and information management, because they are immensely responsible for building capacities in open access and open science, and production of Open Educational Resources (OERs) amongst

educators, scientists, policymakers, and their own peers, while putting in openness in practice through publications, data, repositories, and OERs (Manca et al., 2017; Santos-Hermosa et al., 2020). We consider that preparing information professionals with open knowledge is strategic. Experts insist on the importance of investing in training strategies for future and qualified professionals to develop and promote openness across all levels, from open access to open data, open platforms, and OERs (Atenas and Havemann, 2013; Atenas et al., 2015; Santos-Hermosa, 2019; Ferreira Borges et al., 2020), and on the need to update the syllabi to integrate new educational approaches (Ramírez-Montoya et al., 2021). Thus, LIS schools should adopt an open education approach to build capacities toward enhancing their contribution and impact on society in democratising access to knowledge, since one of the problems of LIS professional training programmes is the traditional nature of the curriculum design (Fabián Maina et al., 2020).

According to the IFLA Guidelines for continuous professional learning (CPL) (Varlejs, 2016; de Alwis Jayasuriya et al., 2021), there is a gap in the research on professional development in the LIS sector; likewise, there are no comprehensive studies about how or if openness is included in Library and Information Science (LIS) programmes. However, there are some interesting studies regarding continuing education for LIS professionals in the South and South-East Asian Regions (such as Pakistan, Maldives, and Indonesia) (Saleem and Ashiq, 2020; de Alwis Jayasuriya et al., 2021) and some studies about the general development of library staff (Welz, 2017; Haglund et al., 2018).

As argued by Borrego (2015), the study of educational programmes in LIS studies tends to focus on other parts of the world rather than Europe; thus, it can be understood that there is no common European approach to LIS education. Consequently, the studies have been focussed on describing the general situation of education in LIS schools (Borrego, 2015) and on the evolution of the Information Schools (iSchools) network (López-Borrull and Cobarsí-Morales, 2017); so, the lack of regional studies in the European region is a research gap that we would like to address. Furthermore, these studies provide a contextual framework of LIS education, but they do not address the specific topic of the “openness,” which according to Ramírez-Montoya (2020) is understood as the capacity to bring together diverse sectors (educational, research, social, enterprise, and cultural) and is also one of the current challenges in the open science, open innovation and research, and open education landscapes.

Our research aims at addressing the following question: What is the state of capacity building in openness/Open Knowledge for LIS professionals? With the aim to support and enable the development and implementation of capacity-building strategies and programmes in openness, it is necessary to provide the stakeholders in the HE sector with the evidence needed to include elements of capacity building in strategies and policies, and in curricula, to narrow the gap between the current needs in professional development and what is in offer training-wise in open knowledge.

We aim at providing such evidence, and guidance, by showcasing the activities that library schools and university libraries across Europe are carrying out in regards to professional

development in openness to knowledge from an undergraduate level to peer-enabled learning, including policymaking and training for fellow librarians, researchers, and students. The uptake and widespread of open science, data, access, and education across Europe require the development of new skills in the HE sector, as recommended by the European Open Science Cloud (EOSC) Skills and Training Working Group (European Commission (Eu) Directorate-General for Research and Innovation, 2021). Therefore, it is key to provide LIS schools with the resources needed to embed openness as a key component of the training program for current and future librarians. Despite the slow but steady increase in data literacy education in librarianship training (Wang, 2018), such as the inclusion of the “Story of Data” course in the Master’s program in LIS taught at the City, University of London, training in openness as a wider concept seems to be still pending, as openness is a key element of the work of academic libraries and open access, open science, open data, and open publishing are currently the heart of academic work.

## Originality

By reviewing the panorama in capacity building in openness in the HE sector, which includes outcomes of research and projects, and also policies and strategies at supranational, national, and institutional levels, we have noticed a gap in regards to capacity building for researchers and educators, and a wider gap in regards to capacity building for librarians, as libraries tend to be the main hub for training and capacity building on openness to knowledge.

The value of this paper is to present the first analysis of the capacity building in openness that sheds light on its presence in policymaking (national and institutional policies and strategies) and in Higher Education (more concretely, in LIS Schools and libraries) in Europe. This study also provides valuable evidence of the situation of capacity building in openness in a specific LIS university curriculum design and important insights to improve and transfer it to other fields beyond this discipline; thus, its originality relies not only on filling the gap, but also in the three-tiered model of analysis, aiming at providing recommendations that can be openly and widely adopted in the HE sector.

## Implications

Our study provides stakeholders in the HE sector with the evidence needed to include elements of capacity building in strategies and policies and in curricula. New information placed in the public domain has implications for universities when designing open initiatives and curriculum design (Fabián Maina et al., 2020) in open knowledge. Thus, the analysis of different sources (supranational declarations, national, and institutional policies, HE syllabus, and librarian training services) will demonstrate what is the current situation and enable the identification of good practices to be followed and the gaps to be addressed. The recommendations proposed in our study will foster the adoption and capacity building of openness.

## Context

Capacity building in openness can be understood as the process of training and fostering practical, technical, and social skills

in relation to openness to knowledge. In order to catalyse and enable openness to knowledge, the idea of building capacity for communities to openly and effectively participate in science and education needs to be included in the processes of shaping policies with regard to access to information and democratisation of knowledge. Openness to Knowledge can be transformative at the HE level, as when a large group of people can participate in activities related to access and creation of knowledge, a long-lasting cultural change can occur at the institutional level, enhancing the experience of researchers, educators, learners, and information professionals (Arza and Fressoli, 2018; Hecker et al., 2018; Fell, 2019; Mwelwa et al., 2020; Agata and Rupert, 2021).

Open knowledge policies should enable informal and certified continuous professional development opportunities to support educators and instructional designers, therefore incorporating learning opportunities both in pre- and in-service training programmes to enhance capacity in a wide range of open practices, from the copyright and licensing to data management, content development, knowledge co-creation, and also training others. Thus capacity building should lay emphasis on developing pedagogic and technical competencies for the creation, use, reuse, and production of open resources, fostering engagement with wider communities through open social learning with peers, considering that the practices and products derived from these capacity-building activities should be aligned with curricular development policies and strategies, as well as considered in promotion and tenure processes when people invest in building capacities in their communities of practice (Nerantzi, 2018; Neumann et al., 2018; Morgan, 2020; Tur et al., 2020; Rodés and Gewerc, 2021).

Training to acquire open skills and competencies has become essential. According to the European Commission (2021) and its European Skills Agenda<sup>1</sup>, more training is needed to provoke a cultural change and advance in the adoption of open science, open education, and the rest of the open ecosystem. Some examples of the current train-the-trainer programmes, offered by diverse associations, aiming at developing and keeping trainers skilled to engage several stakeholders for an effective openness implementation are, for example, LIBER<sup>2</sup> (Ligue des Bibliothèques Européennes de Recherche—Association of European Research Libraries); OpenAIRE,<sup>3</sup> SPARC Europe,<sup>4</sup> and the Research Data Netherlands (which has created the Essentials 4 Data Support course) and collaborative projects like the Open Science MOOC<sup>5</sup> and FOSTER Open Science.<sup>6</sup>

## METHODOLOGY

Due to the nature of this exploratory study, we frame our research in the context of European HE institutions, as we needed a wide range of elements to be compared within a landscape.

<sup>1</sup><https://ec.europa.eu/social/main.jsp?catId=1223&langId=en>

<sup>2</sup>LIBER: <https://libereurope.eu/webinar-recordings/>

<sup>3</sup>OpenAIRE <https://www.openaire.eu/tag/webinars/training>

<sup>4</sup>SPARC Europe: <https://sparceurope.org/>

<sup>5</sup>Open Science MOOC <https://opensciencemooc.eu/>

<sup>6</sup>FOSTER Open Science <https://www.fosteropenscience.eu/>

Hence, we chose Europe as a framework to pilot our approach, aiming at providing a methodology that can be later replicated in other contexts.

To identify good practices in capacity building in openness to knowledge for LIS professionals, a qualitative analysis of text-generated data was conducted through content analysis. This technique involves the identification of core concepts through the review of the frequency of units of meaning, indicators, keywords, and patterns in texts (Krippendorff, 2004; Palmer and Coe, 2020), and has offered us an approach that allowed us to explore the data in the web content analysis of policies and LIS courses, programmes, and research activities of LIS schools in Europe following the recommendations of Audunson and Shuva (2016).

Once we have gathered data, we carried out a conceptual analysis based on a series of steps. We started by mapping the relevant documents and information about the research topics. Then, we determined the occurrence of units of meaning and indicators in the selected documents, such as “openness” and “capacity building.” In order to organise the data and its outputs, our research approach was to analyse the data in categories from macro to a micro level, as can be seen in **Figure 1**.

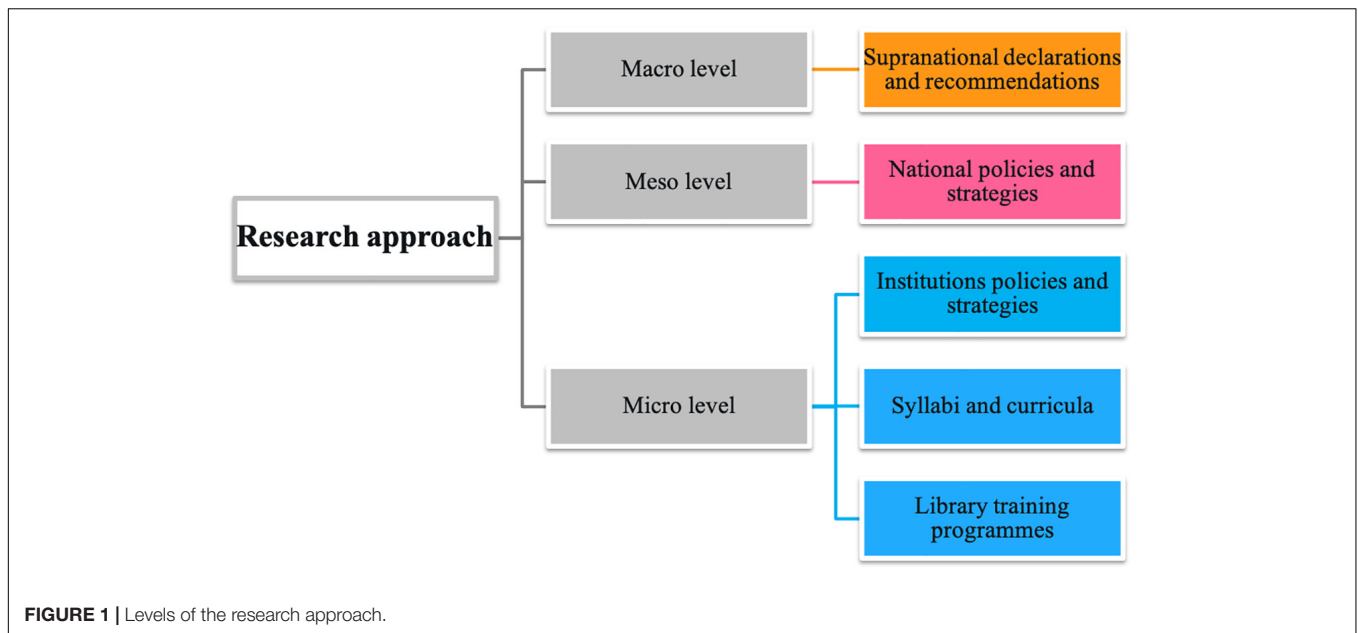
At the macro level, we reviewed 11 supranational declaration recommendations about openness, from the Budapest Open Access Initiative in 2001 to the UNESCO (2021) Recommendation on Open Science to understand how or if these guidelines provide advice for professional development or capacity building for LIS professionals. At the meso level, we reviewed national policies and strategies in open access and/or open science in 10 European countries drawn from the 17 European countries represented in the 36 HE institutions that host a list of LIS schools analysed in this study, to find whether these policies acted as a catalysing agent to promote training in openness,

In regards to the 36 LIS schools reviewed, due to the lack of a European Directory of LIS Schools like the American Library Association (ALA), a searchable database of ALA-accredited programmes (American Library Association (ALA), 2022) in library and information studies in the US, we used several sources to sample a list of LIS schools across Europe, including a study by Borrego (2015) which identified 220 institutions offering LIS education in 26 European countries, the list of member institutions of non-profit associations that promote the European cooperation between LIS schools such as BOTCATSS,<sup>7</sup> and from the European chapter of the Information Schools (iSchool) network,<sup>8</sup> which brings together faculties, or university departments, that share the recognition of information as a field of academic study. Most of our sample was retrieved from the iSchools network, as it also incorporates institutions from different academic traditions, such as library science, information management, information technology, and systems, which gave us a wider perspective of a LIS panorama.

From these 36 LIS schools, we conducted a three-tiered review. First, we assessed if these had institutional policies and

<sup>7</sup>BOTCATSS <https://bobcatsss.info/board-members/>

<sup>8</sup>European chapter of the Information Schools (iSchool) consortium <https://ischools.org/>.



strategies in open access or open science, and in those that had one, we reviewed if there were institutional commitments to build capacities for librarians and other professionals and students in openness to knowledge. Then, we reviewed their syllabi and curricula to understand how or if openness is taught at undergraduate and postgraduate levels. Finally, we reviewed the nature of training on openness provided by these university libraries to the members of their communities.

For the macro and meso analysis, we analysed the full text of the supranational declarations and national and institutional policies by searching the text using keywords, such as “capacity building,” “Skills development,” and “Training” to identify concrete mentions about capacity building, and then we summarised the information. For the micro level, we first identified a list of 80 potential universities that may have had a LIS school, and checked whether these have information displayed on their website in English or another language we were familiar with. After identifying a LIS school or department, we reviewed their websites to identify the availability of the description of their programmes, study plans, curricula, or syllabi. Finally, we identified 36 LIS schools that have a document providing curricular information at undergraduate and postgraduate levels, which were further examined to identify if there were any relevant studies with an openness component.

As for the training offered by the academic libraries, which correspond to the HE institutions that have a LIS school selected for this study, the analysis has also been carried out using the information available on each library web page, specifically by two strategies: a general search (Open) in the searching engine or browsing to identify concrete sections about open access (OA), open science (OSC), or open education (OE), and also reviewing the sections on “library services” and events looking for the training and courses provided.

## RESULTS

Our results, obtained through a (macro, meso, and micro) exhaustive three-tiered review across Europe, show a panorama of the professional development opportunities for the LIS sector, which allow us to indent good practices and gaps in capacity building in openness to knowledge.

In the following sections, we present the outcomes for each tier review.

### Supranational Declarations

To understand how or if the international organisations and coalitions are promoting, guiding, or supporting the development and advancement of openness, we reviewed a series of supranational recommendations and declarations in OA, OSC, and OE from 2001 to 2021 to see whether these include strategies to support the development or enhancement of capacity building programmes for LIS professionals (see **Table 1**).

It can be observed that until 2012, the development of capacities was not clearly and explicitly addressed in the supranational recommendations and declarations. From the launch of the Budapest Open Access Initiative in 2001, we can observe that the emphasis on the declarations is opening up access to knowledge in the shape of academic publications, although there are, if, some scarce yet implicit indications of building knowledge, but we cannot observe any explicit mention of training or capacity building until the 2012 Paris UNESCO OER recommendation which states in its point E to:

Support capacity building for the sustainable development of quality learning materials. Support institutions, train and motivate teachers and other personnel to produce and share high-quality, accessible educational resources, taking into account local needs and the full diversity of learners (UNESCO, 2012, p. 2).



**TABLE 1** | Capacity building in OA, OSC, and OE, a review of recommendations and declarations.

Declaration	Year	Theme	Summary and capacity building mention
Budapest Open Access Initiative	2001	Open access	It states that academic literature should be freely accessible online without expectation of payment. encompassing peer-reviewed journal articles, and any unreviewed preprints, encouraging governments, universities, libraries, editors, publishers, foundations, societies, professional associations, and individual scholars to remove the barriers to open access and building a future in which research and education in every part of the world are free. However, there is no explicit mention of capacity building
UNESCO's 2002 Forum on the Impact of OCW for HE in Developing Countries	2002	Open education	It promotes the adoption of OCW to improve access to quality education and coins the term OER, however, the concept of capacity building for educators and librarians in developing OER and managing OCW platforms is not addressed, however, it is proposed to create communities of practice to develop OER while training should be arranged to promote the adoption of creative commons
Bethesda Statement on Open Access Publishing	2003	Open access	Open Access is described as irrevocable, worldwide and perpetual free access to use, distribute, transmit, and publicly display and distribute the published contents through the appropriate recognition of authorship and are promoted through education and outreach activities, giving high priority to teaching users about the benefits of open access publishing and open access journals, but capacity building for librarians and other professionals is not mentioned.
Berlin declaration on open access to knowledge in the sciences and humanities	2003	Open access	The Open access paradigm is encouraged to maintain quality assurance standards and good scientific practices and promotes establishing open access as a worthwhile procedure by committing each and every individual producer of scientific knowledge and holder of cultural heritage. Open access contributions include original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia materials, however, training and capacity building is not mentioned.
Salvador declaration on open access: the developing world perspective	2005	Open access	Governments are urged to make Open Access a priority in science policy, requiring that publicly funded research be made available to the public, strengthening Open Access journals, repositories and other relevant initiatives in promoting scientific information, however, capacity building it is not addressed in this declaration
Bangalore declaration: A national open access policy for developing countries	2006	Open access	The statement emphasises the benefits of Open Access publishing for developing countries, but it does not address elements of training or capacity building for researchers and librarians.
Cape Town open education declaration: Unlocking the promise of open educational resources	2008	Open educational resources	It encourages governments and universities to make Open Education a priority. Accreditation processes should give preference to OER and repositories should actively include these within their collections. It mentions the participatory culture of learning, creating, sharing and cooperation that rapidly changing knowledge societies need and encourages educators and learners to actively participate in the emerging open education movement. Capacity building to education and information professionals is not explicitly addressed
2012 World open educational resources (OER) congress	2012	Open educational resources	It promotes the development and promotion of OER, as well as to adopt adequate open standards to favour and facilitate the use of these resources at all educational levels. It explicitly addresses support capacity building for the sustainable development of quality learning materials (point e)
UNESCO Ljubljana action plan, UNESCO 2nd World OER. Congress	2017	Open educational resources	This action plan is explicit in addressing the need of capacity building for librarians and educators, by stating the need to support training from Governments, educational institutions, to teachers and librarian training, which are key necessary for the realisation of the suggested actions in this area.
UNESCO OER recommendation	2019	Open educational resources	This declaration aims at supporting member states in developing their OER adoption at strategic level and explicitly includes Librarians as part of the key stakeholders in open education. This declaration promotes education and lifelong learning in two of their key points promoting providing systematic and continuous capacity building to all key education stakeholders.
UNESCO Recommendation on open science	2021	Open science	It promotes the adoption of open science as a catalyser for good science, and states that open science requires investment in capacity building and human capital promoting the use of OER as an instrument for open science capacity building to increase access to open science educational and research resources, improve learning outcomes, maximise the impact of public funding and empower educators and learners to become co-creators of knowledge.

Librarians and other LIS professionals are not mentioned as part of key stakeholders in regards to building capacities until the UNESCO Ljubljana action plan which states in point 1. Building the capacity of users to find, reuse, create, and share OER recommends to:

Effectively use OER, educators, learners and librarians need the capacity to find, re-use, modify and share materials created under an open license. Furthermore, user-friendly tools to locate and retrieve OER need to be mainstreamed. Support and action in

particular from Governments, educational institutions, especially teacher and librarian training institutions as well as professional associations; are necessary for the realisation of the suggested actions in this area (UNESCO, 2017, p. 3).

The OER UNESCO (2019) recommendation (4), in its point (i) “*Building capacity of stakeholders to create, access, re-use, adapt and redistribute OER, the list of stakeholders in the formal, non-formal and informal sectors,*” includes a wide range of actors, yet librarians and information professionals are not explicitly

listed; however, they are included in “*cultural institutions (such as libraries, archives, and museums).*”

Finally, the UNESCO (2021) recommendation on Open Science explicitly includes librarians and information specialists as stakeholders in research and innovation systems, and it fosters funding and investment policies and strategies for science that include capacity building of all actors, as in its point IV, it promotes: Investing in human resources, training, education, digital literacy, and capacity building for open science by:

*a. Providing systematic and continuous capacity building on open science concepts and practices, including broad comprehension of the open science guiding principles and core values as well as technical skills and capacities in digital literacy, digital collaboration practices, data science and stewardship and . . . [.]d. Promoting the use of OER as an instrument for open science capacity building (UNESCO, 2021, p. 36).*

We consider that it is key for any forthcoming declaration and recommendation to continue to explicitly address the importance of capacity building both at the pre-service and professional development level, including elements such as funding and curriculum design for information, education, and science professionals to advance the adoption of OA, OSC, and OE.

At the supranational level, 3 of the 11 recommendations and declarations reviewed for this research mention the need of supporting developing capacities for librarians; however, it is not until the UNESCO (2017) Ljubljana action plan in that librarians were explicitly addressed. Until then, there was an implicit message with regard to who and how one should be trained. However, the latest supranational recommendations (2019 and 2021) are addressing capacity building for librarians as key stakeholders in the development of skills for others.

## National Plans and Strategies

After reviewing supranational declarations and recommendations to understand the guidance given to countries and institutions in regards to the adoption and advancement of OA, OSC, and OE, we have reviewed whether the countries of the LIS schools selected for this study have any sort of policy or strategy on these themes and if the institutions that host the 36 LIS schools also hold a policy and strategy to promote them.

Out of the 17 European countries represented in the 36 LIS schools analysed, we found 10 that have a national policy, action plan, or national strategy to promote OA, OSC, or OE (see **Table 2**).

In general terms, most of these national strategies ensure open access to Research and Development results in line with European legislation to increase their integration into the European Research Area, as per the European Commission Recommendation 2018/790, of 25 April 2018, on access to and preservation of scientific information requests to member states to “set and implement clear policies (as detailed in national action plans)” (European Commission (EU), 2018, p. 3) and covering OA to publications, management of research data, preservation and reuse of scientific information, infrastructures for open research, skills and competencies, and incentives and rewards.

Also, in these 10 national plans, we reviewed if these address capacity building in openness and whether these promote any

programme in this regard. As a result, three main patterns were identified in four of them, from less to more involvement (see **Table 3**): those offering some support to capacity building, those including a section or specific mention to open skills need, and those that promote some action or training programme or the provision of human resources.

Therefore, further commitment to openness is observed in national strategies and plans rather than in capacity building, depending on the approach and the specific mentions regarding its content.

## Three-Tiered Review Across Europe: Curricula, Institutional Policies, and training

Here, we present the results of the three-tiered analysis conducted at the micro level, as we first reviewed the institutional policies and strategies in open access/open science of the 36 selected institutions. Then, we analysed the syllabi and curricula courses about openness to knowledge in their undergraduate and postgraduate programmes, and, finally, we reviewed the training provided by their university libraries toward building capacities in OA, OSC, and OE.

**Table 4** showcases the three levels of data analysed across the HE institutions and LIS schools: their institutional policies and the mention of capacity building in these contexts, the inclusion of openness across the taught courses, and capacity building and training programmes in the academic libraries. In the following subsections, we present the outcomes for each tier review.

### Openness in the Library and Information Science Syllabi—Education at Undergraduate and Postgraduate Levels in Openness to Knowledge

After carefully and thoroughly reviewing the curricula and syllabi of the aforementioned 36 LIS schools on themes related to openness to knowledge, we did not find any evidence of pre-service training being included in curricula either at programme or at the module level, both in undergraduate and postgraduate programmes in any of the institutions reviewed. The only exception is the Universitat de Barcelona, which has recently launched a postgraduate certificate program in Open Science in their LIS school named “Open Science: promotion, support and assessment”,<sup>9</sup> which is intended for:

staff from university and research libraries, management teams in university and research centres, and staff from management units in research institutes, centres, and facilities, who carry out activities related to research assessment, research support, and knowledge management, and who want to improve their knowledge, incorporate the experience into their work, and reflect on their adaptation to this new environment.

Most of the curricula reviewed put emphasis on information management and information architecture, and there is still loads of traditional librarianship being taught in LIS schools, such as cataloguing and classification. However, there is quite a lot of advancement in areas of information literacy, preservation, and

<sup>9</sup>[https://www.ub.edu/portal/web/information-audiovisual-media/openscience\\_introduction](https://www.ub.edu/portal/web/information-audiovisual-media/openscience_introduction)

**TABLE 2** | National policies, action plans, or strategies to promote OA, OSC, or OE.

Country	National plan or strategy (year)	Summary
Croatia	Croatian Research and Innovation Infrastructures Roadmap (2014)	This roadmap fosters the promotion of open access to research data, especially data funded from public sources and promotes cooperation between various scientific and research institutions and allow open access to the use of research infrastructure
Czech Republic	National Research, Development and Innovation (NDI) Policy of the Czech Republic 2021 + (2020)	The vision of the National Policy is to use efficient support and targeting of research, development and innovation to contribute to the prosperity of the Czech Republic
Finland	Policy for Open Access to Research Data and Methods (2020–2025) Policy for Open Access to Scholarly Publications Policy for Open Education and Open Educational Resources	Finland has a series of national policies in different areas of openness to knowledge that include long term action plans for the HE sector.
Ireland	National Framework on the Transition to an Open Research Environment	It proposes that Those involved in each stage of the research process should have the capacity and skills necessary to enable FAIR data.
Netherlands	National Plan Open Science	It states that as a matter of principle, it is important that society as a whole should benefit from publicly funded research. An innovative open model needs to be developed to enable target audiences such as SMEs3, municipalities and the “ordinary citizen” to access research results
Slovenia	National Open Science Portal	The Slovenian strategy is focused in promoting and supporting HEIa and scholars in using a national repository built following the EU Commission on OA and the compliance of the portal with the OpenAire guidelines
Spain	Estrategia Española de Ciencia, Tecnología e Innovación 2021–2027	Designed to facilitate the articulation of the Spanish R&D&I policy with the EU framework program for science and innovation, Horizon Europe (2021–2027). Open science is one of the pillars of Goal 4 (Generation of knowledge and scientific leadership), which is aimed to favour the generation of knowledge of high quality and impact, as well as its transmission to society.
Sweden	National Policy	In 2015, the Swedish Research Council developed a proposal for national guidelines for open access to scientific information, including publications, research data and artistic works. The proposal has been adopted and states that research results must be accessible to everyone via the Internet. The results must be available free of charge on the internet no later than 6 months after they are published.
Switzerland	Swiss National Science Foundation (SNSF) Open Access to Publications Policy	The SNSF open access policy goes hand in hand with the national strategy pursued by the Swiss higher education institutions. They decided that all publicly funded publications must be freely accessible as of 2024
United Kingdom	Research Excellence Framework (REF) Open Access Policy 2021	It states that the Author-Accepted Manuscript of all articles and conference proceedings must be deposited in an open access institutional (i.e., Open Research Online) or subject repository within 3 months of the date of acceptance with the publisher although articles published as Gold open articles are exempt from the policy requirement

data management, although there is a gap in curricular training in openness to knowledge despite being in the library and policy field for nearly 20 years. We assume that capacity-building and awareness-raising programmes are embedded in the teaching models and subjects, but they are not visible when reviewing the curricula made available to the public, thus our results coincide with the information available in the institutional portals.

### Inclusion of Capacity Building for Library and Information Science Professionals in Institutional Policies and Strategies

At the policy level, 27 out of the 36 institutions reviewed have an institutional OA policy and or a mandate, while another 3 have an open strategy. The remaining six institutions do not have an OA policy; however, three of these institutions are aligned with their national strategy.<sup>10</sup> Thus, 84% of the total institutions reviewed have an institutional or national policy or strategy aiming at fostering, promoting, and adopting openness to knowledge.

<sup>10</sup>LIS in Croatia, Sweden, and Switzerland.

We have observed some particularities in the identified policies. First, we noted that some institutions have two or more policies, which tend to be general and specific policies, for example, Oxford University has an OA statement (2013) and a policy (2018), while Northumbria University has a first OA policy from 2005, a subsequent one from the UK Research Council (2013), and a current one from the UKRI OA Policy (2021). Finally, Manchester Metropolitan University has an OA policy (2019) and a more specific policy for Research Data Management that includes OA (2020).

With regard to the three institutions that do not have an institutional OA policy, Charles University has signed the Berlin OA Declaration and includes the OA focus in its Code of Ethics and in their Editorial policy, Linnaeus University has a vice-chancellor OA guideline for electronic publishing, and Seinäjoki University of Applied Sciences is part of an open project of the Finnish Ministry of Education along with 25 other universities of applied sciences in the country. Thus, as can be seen, there might be a wide commitment toward enhancing and fostering openness to knowledge in the HE European landscape.

**TABLE 3** | Capacity building in national policies or strategies.

Approach	Detail in the policy	Country
Mentioning support to capacity building	"Support for training, innovation and the development of technology" along with supplying scientific communities with data production and processing services.	France (Second National Plan for Open Science)
Section or mention on "Skills for open science and open data"	Capacity building and empowerment in these areas have been accorded high importance in Portugal since the beginning of 2000. Moreover, given the current financial crisis and high rate of unemployment, "Portugal is seeking to invest in training in data-related areas, specifically in courses designed to develop digital skills in big data, data management and business analytics". <sup>a</sup>	Portugal
	Are mentioned "measures include putting in place personal development and career plans and expanding continued education and lifelong learning. It comprises steps to develop the necessary skills and expertise in research and managerial work and teamwork enabling cooperation with other RDI actors to develop and deepen" (p. 33).	Czech Republic
Mention some action or training program or human resources provision	"Action 26" in which two training strategies are proposed: -The Ministry of the Interior will set up an innovation laboratory to overarch the systemic measures. The innovation lab's activities will focus on supporting and fostering innovative thinking, capacities and leadership, and will do this <i>via</i> training programs and workshops for public administration employees and their superiors -The IPO (Industrial Property Office) website will offer free teaching aids for educators created by the European Patent Organisation (EPO) and European Union Intellectual Property Office (EUIPO) or interactive e-learning courses on the basics of industrial rights.	Czech Republic
	One of the approaches designed to achieve the objective of promoting R&D&I and its transfer is to use trained human resources in open access to data, microdata, publications, code (software) and, in general, to all results of publicly funded research.	Spain

<sup>a</sup>Portugal - Open science country note <https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/content/portugal-open-science-country-note/index.html>.

Out of the 30 institutional policies reviewed, we found out that 9 mention training in openness; thus, the outlook varies slightly following a diverse range of perspectives (which are detailed in **Table 5**): a general approach to the topic, raising awareness and promoting OA, including responsibility for the provision of training, providing concrete actions to support and monitor it, and fostering training focussed on doctoral schools.

Results suggest that although most of the institutional policies reviewed aim at fostering openness to knowledge in some way, there are different speeds and working rates to implement capacity building.

### Training for Researchers and Students in Academic Libraries

To understand how these 36 universities commit to developing capacities in OA and OSC, we reviewed their library websites as these usually have a web service or section dedicated to OA/OSC. We noticed that, despite not including openness in their LIS courses, 34 of the HEIs offered some kind of training on aspects of openness, which we classified into four key types of capacity-building programmes in academic libraries (see in **Table 6**): training materials (subject guides, video tutorials, etc.), workshops and webinars (face-to-face and online), one-off training events (organised for a specific occasion), and courses.

All these types of training usually are available as part of the Library Support for researchers or the training services. In addition, in some libraries there is an open access team, responsible to organise training and other events; a Library's Open Access Helpdesk, to assist and create guides about OA; or even an OA department, such as the OA Support Centre of the Central Library of Charles University; or an Office for Open Science at UCL. Some of these workshops are organised with

organisations such as OpenAIRE, while others are created on the occasion of the Open Access Week<sup>11</sup> or because of a collaboration with the doctoral schools or an OA Support Centre (such as the one at Charles University).

### Joint Initiatives—The Role of Library Consortia in Capacity Building

Through our research in academic libraries, we noticed two additional scenarios. Some libraries tend to collaborate as consortia and some others have an inter- and cross-university partnerships with other libraries and departments. Such partnership models often have worked quite well when buying books or negotiating deals with publishers (consortia deals), and also seem to be key to collaboration for capacity building, as we found joint initiatives in the shape of online courses on open science and open access. Some examples are listed below.

1. Research data management website of Humboldt-Universität zu Berlin<sup>12</sup>: it is a joint initiative of the central units of Computer and Media Service (CMS), Research Service Centre, as well as University Library and Vice President for Research of the university. In addition to specific information and support, they offer video tutorials and training workshops.<sup>13</sup>
2. Hamburg Open Science: it is the implementation of a cross-university strategy by the University of Hamburg (UHH) in cooperation with the University Information and Library

<sup>11</sup>Open Access week <http://www.openaccessweek.org/>

<sup>12</sup>Research data management website of Humboldt-Universität zu Berlin <https://www.cms.hu-berlin.de/en/dl-en/dataman-en/>

<sup>13</sup>Training, workshops, and other events of the research data management initiative. <https://www.cms.hu-berlin.de/en/dl-en/dataman-en/support/training>



**TABLE 4 |** LIS schools: openness in curricula and capacity building in policies and library training.

Country	Institution	LIS school/department	OA policy	OSC policy	Education at UG and PG in openness	Library training in OA/OSC/OE
Croatia	University of Osijek	Josip Juray Strossmayer	No	No	No	Yes
Czech Republic	Charles University in Prague	Institute of Information Studies and Librarianship (IISL), Faculty of Arts	No	Yes	No	Yes
Finland	Seinäjoki University of Applied Sciences	Library and Information Studies—School of Business and Culture	No	Yes	No	Yes
	University of Tampere	Communication Sciences Unit	Yes	Yes	No	Yes
France	ENSSIB	Ecole National supérieure des sciences de l'information et des bibliothèques	No	No	No	Yes
Germany	Hochschule Hamburg	Library and Information Management- Bachelor of Arts, Department Of Design, Media and Information	Yes	No	No	Yes
	Humboldt-Universität zu Berlin	Berlin School of Library and Information Science	Yes	Yes	No	Yes
	Universität Siegen	School of Media and Information	Yes	Yes	No	Yes
	University of Regensburg	Institute for Information and Media, Language and Culture	Yes	Yes	No	Yes
Ireland	University College Dublin	Faculty of Engineering in cooperation with the Faculty of Arts	Yes	Yes	No	Yes
Italy	University of Bologna	Library and Archive Science—Cultural Heritage	Yes	No	No	No
MALTA	University of Malta	Faculty of Media and Knowledge Science- Department of Library and Archive Sciences	Yes	No	No	Yes
Netherlands	University of Amsterdam	Communication and Information Studies	No	Yes	No	Yes
	University of Groningen	Graduate School of Humanities, Archives and Information Studies	Yes	No	No	Yes
Norway	Oslo Metropolitan University	Department of Archivistic, Library and Information Science	Yes	Yes	No	Yes
Portugal	Nova University Lisabon	Information Management School	No	Yes	No	Yes
	University of Porto	Faculty of Engineering in cooperation with the Faculty of Arts	Yes	Yes	No	Yes
Slovenia	University of Ljubljana	Department of Library and Information Science and Book Studies	Yes	No	No	Yes
Spain	Polytechnic University of Valencia	School of Informatics	Yes	Yes	No	Yes
	Universidad Carlos III de Madrid	Department of Biblioteconomía y Documentación, Faculty of Humanities, Communication and Documentación	Yes	Yes	No	Yes
	Universidad de Granada	Facultad de Comunicación y Documentación	Yes	Yes	No	Yes
	Universitat de Barcelona	Facultad de Información y Medios Audiovisuales (FIMA)	Yes	Yes	No	Yes
	Universitat Oberta de Catalunya	Information Science and Communication Studies <sup>a</sup>	Yes	Yes	No	Yes
Sweden	Linnaeus University	Information Institute (IInstitute)	No	Yes	No	Yes
	University of Boras	The Swedish School of Library and Information Science (SSLIS)	No	Yes	No	Yes
Switzerland	University of Applied Sciences of the Grisons	Swiss Institute for Information Science	No	Yes	No	Yes
United Kingdom	City University	Department of Library and Information Science	Yes	No	No	Yes
	Manchester Metropolitan University	Department of Computing and Information Sciences	Yes	Yes	No	Yes
	Northumbria University	Computer and Information Sciences	Yes	Yes	No	Yes
	Oxford University	Digital Humanities—Department of Engineering Science	Yes	Yes	No	Yes
	Robert Gordon University	Department of Information Management of Aberdeen Business School	Yes	Yes	No	Yes
	University College London	Department of Information Studies- Faculty of Arts and Humanities	Yes	No	No	Yes
	University of Glasgow	Digital Media and Communications	Yes	Yes	No	Yes
	University of Sheffield	Sheffield Business School	Yes	No	No	Yes
	University of Strathclyde	Computer and Information Sciences	Yes	Yes	No	Yes

<sup>a</sup>Unfortunately, and despite the efforts of the academic body, the LIS school at UOC will soon cease its activities. However, some LIS courses are still taught.

Service (HIBS), and other universities<sup>14</sup> have created the *Hamburg Open Science program*.<sup>15</sup>

<sup>14</sup>The Technical University of Hamburg (TUHH), the University of Applied Sciences Hamburg (HAW), the HafenCity University Hamburg (HCU), the University of Fine Arts (HfBK), the Hamburg University of Music and Theatre

(HfMT), the University Medical Center Hamburg-Eppendorf (UKE), and the State and University Library Hamburg Carl von Ossietzky (SUB) together with the Authority for Science, Research, Equal Opportunities, and Districts (BWFGB).

<sup>15</sup>Hamburg Open Science program <https://openscience.hamburg.de/de/startseite-hamburg-open-science/>

**TABLE 5 |** Capacity building in institutional policies.

Approach	Detail in the policy	Institution
General approach	"Adequate support for—and the central coordination of—training courses will ensure that tailor-made solutions can be more widely used by the faculties"	University of Groningen
	"Where appropriate, provide discipline-specific data management training, support and advice, particularly on aspects such as data ownership and ethics" (University of Glasgow).	University of Glasgow
Stating explicitly responsibility for the provision of training	"Support and advice on research data management"	Manchester Metropolitan University
	"Information and advice on OA matters via the Bodleian Libraries"	Oxford University
	"Implement any training or skills development required by researchers to execute their responsibility"	University College London
	"Training, awareness training and guidance for the teaching and research staff about open access and open science"	Universitat Oberta de Catalunya
	"In this last case, it is specified that "is responsibility of the Library and Learning Resources Department, the Research and Innovation Department and Personnel" (Universitat Oberta de Catalunya, 2021, 10)	
Providing concrete actions and monitoring	"Support and monitoring": 4.1 Adoption of Open Access shall be supported through the organisation of seminars, awareness raising events, and educational and training ventures"	University of Malta
Through raising awareness and promoting OA	"The procedures, organisational aspects, regulatory details, promotion, training, awareness raising and support activities for the implementation of Open Access will be the subject of specific documents drawn up after an initial experimentation phase"	University of Bologna
Fostering training focus on doctoral schools	"The Graduate Schools will ensure that arrangements are made with Ph.D. students regarding data management and the recording of such arrangements in these students' training and supervision plans.	University of Groningen

3. Researcher Development Programme for Postgraduate Student: library services of the Northumbria University together with Graduate School, Vitae, career support, AHRC Centre for Doctoral Training, and research bursaries.
4. The 4EU + European University Alliance: it is a European association of six partner universities—Charles, Heidelberg, and Sorbonne Universities, and the Universities of Copenhagen, Milan, and Warsaw. It offers a series of workshops: *Open for you! An introduction series to open science*.<sup>16</sup>

To summarise the results, at **the macro level**, we have found that until 2012 the development of capacities was not clearly addressed in the supranational recommendations and declarations and that librarians were not explicitly mentioned until the UNESCO (2017) Ljubljana action plan in **At the meso level**, while most of the revised national strategies guarantee some kind of openness (mainly related to open access to research results, in line with the European Research Area and legislation), capacity building is not regarded as a priority or addressed at a lower level. At the **micro level**, the outcomes of the three-tiered analysis first showcase a gap in curricular training in openness to knowledge (almost no evidence of LIS university programmes has been identified). Second, most institutional policies reviewed foster openness to knowledge (in a diverse range of perspectives), but at the same time, there are different speeds and working rates in regards to capacity building. Finally, most evidence and ideas on the capacity building can be found in the programmes from academic libraries that offer training on openness (including training materials, workshops, one-off training events, and courses) and they collaborate

together (through consortia and cross-university partnerships) by providing joint training initiatives.

## DISCUSSION

So, what is the state of capacity building in openness/Open Knowledge for LIS professionals? After reviewing the landscape of LIS professional development in openness, we can argue that despite the enormous efforts made by librarians to advance the understanding and adoption of open knowledge, most of the OSC training activities in universities are prepared and conducted by academic librarians (Schöpfel et al., 2019) and libraries usually are leading or acting as main coordinators in OSC training (Ayris and Ignat, 2018; Swiatek, 2019), the results of this research clearly show that LIS schools are not providing training to gain skills and competencies in openness and, therefore, need to be prepared to the changing demands of the twenty-first century users (Shonhe, 2020) in an expanding job landscape.

The analysis by Rafiq et al. (2017) revealed that training offered in LIS Schools are not fulfilling the requirements of LIS professionals. Some studies (López-Borrull and Cobarsí-Morales, 2017; de Alwis Jayasuriya et al., 2021; Muzamil and Nabeel, 2021) indicate that there is a lack of suitable training programmes and that LIS professionals are equipped with traditional knowledge for specialised librarianship roles, but the skills required in the new academic context and job market are given little importance in the existing LIS curriculums. Considering the ever-evolving ICT environment, LIS professionals need to develop high skills to adapt to these changes; thus, Ameen (2009) suggests that LIS schools should come forward to play their role in training working librarians. Furthermore, Tyagi and Yanthan (2016) add that the revision of

<sup>16</sup> *Open for you! An introduction series to open science* <https://4euplus.eu/4EU-273.html>

**TABLE 6** | Capacity-building programmes in academic libraries.

Type	Number of libraries	Detail
Training materials	22	Mainly subject or research guides about Open Access, Open Science, Open Publishing and Research Data Management. There are also video-tutorials, specialised blogs (e.g., Open Science blog <sup>a</sup> from the University of Groningen Library), etc.
Workshops and, webinars	9	Face-to-face and online or webinars (e.g., <i>Open Access in a nutshell</i> <sup>b</sup> , from the Charles University)
One-off training events	6	Some examples are the <i>Open Access Publication in the Spotlight</i> event <sup>c</sup> University of Groningen Library or <i>Library Presentation Menu</i> <sup>d</sup> with sessions such as “Open Access with one click” or “Open Access for Dummies,” at the Swedish School of Library and Information Science (SSLIS) or the <i>Open for you</i> event <sup>e</sup> , from the Charles University.
Courses	4	These are usually held in an LMS or VLE. For instance, the research data management <sup>f</sup> and open access courses <sup>g</sup> from Charles University. These kinds of courses seem to be, mainly, for Ph.D. students but also for researchers.

<sup>a</sup>Open Science blog: <https://www.rug.nl/library/open-access/blog/open-access-publication-in-the-spotlight-november-long-term-effects-of-acceptance-and-rejec>.

<sup>b</sup>Open Access in a nutshell [https://www.youtube.com/watch?v=VWQQ1\\_OVxaw](https://www.youtube.com/watch?v=VWQQ1_OVxaw).

<sup>c</sup>Open Access Publication in the Spotlight event <https://www.rug.nl/library/open-access/blog/open-access-publication-in-the-spotlight-january-planetary-limits-to-soil-degradation>.

<sup>d</sup>Library Presentation Menu <https://www.hb.se/en/university-library/support-for-researchers/support-and-services/library-presentation-menu/>.

<sup>e</sup>Open for you event <https://4euplus.eu/4EU-273.html#7>.

<sup>f</sup>Research data management <https://openscience.cuni.cz/OSCIEN-66.html#2>.

<sup>g</sup>Open access courses <https://openscience.cuni.cz/OSCIEN-66.html#4>.

the syllabus every 5 years would be beneficial for both theory and practical courses. Ashiq et al. (2018) also suggest working with library associations and professional bodies in the design of the LIS curriculum.

In Europe, most of the LIS schools have already integrated digital librarianship in their taught programmes, and recently, there has been an increase in data literacy, as data is a core field of action for the European chapter of iSchools and one of the priorities of the European Commission and its European Data Portal (Audunson and Shuva, 2016; López-Borrull and Cobarsí-Morales, 2017; Wang, 2018; Van Hesteren and van Knippenberg, 2021). However, there is still a gap in education about openness (Rodríguez, 2015), which has not yet been fully embraced by LIS schools or programmes (Chiware, 2020).

Despite the lack of training in openness identified in the LIS curricula, we have noticed that academic libraries are using their experience and internal training to support the understanding of openness by offering training materials at workshops, webinars, and other related events. As Rodríguez (2015) suggests, the OA week events and webinars organised by academic libraries are often an entry point for library staff to the basics of openness and an opportunity for their professional development. All these library-based training activities, together with professional networking, for example, social media and mailing lists, can be considered as CPD (Robinson and Glosiene, 2007).

Thus, CPD is addressing the gap between formal education and practice in the field, which is useful for qualified librarians who want to update their knowledge. However, early career LIS professionals should have had openness embedded into the LIS school curriculum; thus, as recommended by Ashiq et al. (2020) and de Alwis Jayasuriya et al. (2021), it is key to formalise the relationship of CPD with professional associations and LIS Schools, to enhance the training programmes these can offer, as shown by the results obtained in this research, since joint training

initiatives in which the library is involved (as a leader or as a mere participant) tend to be quite successful.

Since librarians are becoming co-researchers and liaisons in teaching, they should have sufficient open skills and confidence to support their academic communities (Wang, 2018; Chiware, 2020; Saleem and Ashiq, 2020). Also, since there is a long tradition and experience between libraries and the open movement (Mukherjee, 2010), core competencies for LIS professionals have been mapped and included, such as Digcomp 2.0, the FOSTER + learning resources, and the LIBER Open Science Roadmap focus areas. Furthermore, LIBER and its Digital Skills for Library Staff and Researchers Working Group have identified the skills and knowledge needed to practice openness effectively (McCaffrey et al., 2020), which in addition to Scholarly Publishing, FAIR data, and Citizen Science, also includes Metrics and Rewards and Research Integrity. Libraries are also becoming one of the crucial stakeholders in the advancement of OER implementation (Santos-Hermosa et al., 2020) and in open access book publishing, although the latter has not (yet) gained momentum in Europe (Morka and Gatti, 2021).

Thus, librarians are key for supporting OA and OSC, from supporting researchers in the self-archival of publications in repositories, to helping scientific journals to become openly accessible (Abadal, 2013) and advocating for the development of open policies and licensing copyright services, while participating in negotiations with commercial publishers and enabling transformative agreements (Ayris and Ignat, 2018), and also developing open FAIR data ecosystems (Swiatek, 2019; Swiatek et al., 2020) has changed the librarians' field of action dramatically, but their formal education has not.

More recently, the COVID-19 pandemic has also served as a disruptor in the role of libraries, as, for example, librarians had to develop new skills to help deploy extra support to researchers and educators in the shape of OER and workshops. In this sense,

an emergent job market constitutes a potential growth area for LIS schools. Understanding this will provide a roadmap to LIS schools for the future direction of their programmes (Malik and Ameen, 2021). Furthermore, as noted by Peekhaus (2021), the faculty in LIS schools are relatively engaged in OA matters, so LIS scholars should be at the forefront of efforts to expand openness to their teaching. Hence, conversations on enhancing practice need to happen at the faculty level toward co-designing of the curriculum in partnership with those already championing the building of capacities in the field.

At the policy level, our analysis has evidenced that these instruments need to stress the importance of training in openness (as can be seen in numerous mentions) by providing guidance and funding schemes to enable capacity-building programmes. Although some policies focus on capacity building and training empowerment, it seems that it is more a declaration of intent than a reality, since we observe that, with the exception of some cases, the intention has not yet materialised in formal training courses in the universities.

Our Contribution To The Field is to help address the gap in education and training in openness to knowledge, and provide evidence, good practices, and recommendations for the HE sector. This research contributes to support the sustainable development of open knowledge policies in HE and, more specifically, to foster capacity building in LIS schools to present and future LIS professionals, by putting into practice the principles of the European Pillar of Social Rights<sup>17</sup> and The European Skills Agenda<sup>18</sup> access to education, training, and lifelong learning for everybody and everywhere in the EU.

## CONCLUSION AND RECOMMENDATIONS

Our analysis showcases an existing dichotomy in the academic sector, as institutional policies assign libraries the responsibility for raising the awareness, guidance, and training of openness to faculty and students (such as the UOC and Oxford); however, their library staff is not “officially” trained for it, or, at least, they have neither received formal training nor they have been given the opportunities to gain a qualification in the area. Hence, these are relying on the capacity of LIS professionals to self-acquire the skills needed to perform their jobs (Rodriguez, 2015; Swiatek, 2019; Santos-Hermosa et al., 2021).

The current gap in the capacity building provides us with a unique opportunity to open a conversation in the sector that includes academics, professional bodies, librarians working in openness, and also users from the libraries. We propose that openness is fostered as part of the core digital skills a librarian should have, so they are not only capable of providing support in opening up knowledge, but in contributing to a fair knowledge ecosystem for the society, supporting

peers, educators, and researchers in co-creating, generating, reusing, and sharing knowledge, thereby facilitating access beyond the walls of their own library and thus democratising information.

Thus, we recommend considering the following points at policy and strategy levels:

At the macro level:

1. Promote the inclusion of capacity building as the core element of openness to knowledge, including elements of budgeting and funding for training activities
2. Include, as part of the recommendations, good practices in capacity building in openness to knowledge
3. Promote the development manifestos that support the development of curricula in openness to Knowledge for LIS professionals

At the meso level:

1. Define a series of competencies and literacies in the different areas of openness to outline appropriate strategies that can be put in place to incorporate them into the existing LIS curricula.
2. Ensure that open knowledge policies and strategies include a budget for capacity building for librarians
3. Emphasise the importance of including openness to knowledge as one of the areas of specialised librarianship

At the micro level:

1. Co-create curricula and OERs in openness to knowledge for LIS learners and professionals that can be adopted by any library school
2. Reorienting LIS academic programmes and redefining the curriculum toward including openness across every course.
3. Provide open and flexible CPD that can be used in formal or informal LIS education programmes.

## Future Scope of the Study

We aim at widening participation in the future stages of this research, including other stakeholders in further exploring the challenges and barriers to capacity building in openness to knowledge, toward driving a collective agenda in building context and culturally appropriate curriculum in different elements of openness to knowledge, such as open access, open data, open education, and open software.

In this sense, as part of this research, we are collectively working on developing a collaborative toolkit to help in opening up and designing open syllabi that can be useful to adopt and adapt programmes or elements of programmes in curriculum development to facilitate the adoption of openness.

## DATA AVAILABILITY STATEMENT

The original contributions presented in this study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

<sup>17</sup>[https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people/jobs-growth-and-investment/european-pillar-social-rights\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people/jobs-growth-and-investment/european-pillar-social-rights_en)

<sup>18</sup><https://ec.europa.eu/social/main.jsp?catId=1223&langId=en>



## AUTHOR CONTRIBUTIONS

GS-H: supervision and leadership of the research activities, including the coordination of the article. Literature review, analysis of the national, institutional policies/strategies, and library training programmes, discussion, co-design of the research, co-analysis of results, and conclusion. JA: co-design of the research, analysis of the supranational declarations and LIS curricula, co-analysis of the results, editorial work, and

translation. Both authors contributed to the article and approved the submitted version.

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