Information literacy and the information science curriculum

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Keypoints

- The elements that researchers have suggested that should be incorporated into the information literacy curriculum for library and information science (LIS) are organized and presented under six categories: 1) curricular implementation and general challenges; 2) topics the curriculum must include; 3) inclusion of education-related topics; 4) integration of other literacies; 5) methodologies for the information literacy curriculum; and 6) workplace and social implications.
- The curricular implementation of information literacy in a LIS academic program might be done in different ways, which are not necessarily mutually exclusive: 1) through one or more dedicated compulsory courses during the academic program and at the different educational levels; 2) Set a transversal implementation of information literacy components in other courses during the LIS program.

- The information literacy curriculum in LIS is not just about developing students' information literacy skills; it might consolidate them and take them to advanced levels, but this is about half of what this curriculum should achieve, as the other half involves preparing students to be future information literacy trainers and advocates.
- Although this entry does not make strong distinctions between the vast number of literacies that have been proposed, it takes the approach of dealing with the curriculum from the perspective of information literacy, while implying that it is not mutually exclusive with other literacies, which can be incorporated, as they have unique elements that are relevant for future library and information scientists.
- A non-exhaustive review of information literacy programs resulted in identifying the following seven as the most complete and those that fulfill the purpose of training future information literacy trainers and advocates; these are offered in the following universities: Universidad Nacional Autónoma de México, Humboldt-Universität zu Berlin, Universidad Autónoma de Chihuahua, University College Dublin, University of Texas at Austin, Sheffield University, and Aberystwyth University.
- A holistic curriculum design would encompass dedicated compulsory courses and the transversal implementation across other subjects.
- Recognizing the interconnected nature of various literacies, the curriculum should not center exclusively on information literacy but integrate it with other essential literacies such as digital, media, and data literacy. This inclusive approach ensures that students gain comprehensive skills relevant to future library and information scientists.
- The information literacy curriculum should adopt diverse methodologies based on constructivist principles, emphasizing practical experiences and hands-on learning. This approach facilitates a deeper understanding of information literacy by focusing on learners' existing knowledge and experiences and encouraging active participation in the learning process.
- Beyond the academic and professional competences, the curriculum should address workplace challenges and the social implications of information literacy to prepare students to implement information literacy in various professional contexts and foster a well-informed, ethical, and responsible society.

Abstract

This entry provides a background to information literacy education in the library and information science (LIS) curriculum by presenting a summary of the elements and characteristics that information literacy courses should include. These are divided into six categories: 1) curricular implementation and general challenges; 2) topics the curriculum must include; 3) inclusion of education-related topics; 4) integration of other literacies; 5) methodologies for the information literacy curriculum; and 6) workplace and social implications. Then, it includes a brief and non-exhaustive review of 41 LIS programs, including courses on information literacy and related subjects. Finally, we offer some brief considerations for the future perspectives of this topic.

Keywords: information literacy, digital literacy, media literacy, curriculum, library and information science, curricular implementation, professional education and training, curriculum methodologies, workplace implications, social implications, information literacy programs, critical competences, advocacy, teaching and learning methodologies.

Introduction

We are currently undergoing a critical process of informational transition because of the constant changes that information and communication technologies are undergoing, together with the accelerated flow of information production on the Web, with alternative and spontaneous ways of creating knowledge. The next generations are losing the basic notion of what printed information sources represent, most probably due to the more accessible routes to training resources and because of the significant influence of natural language processors with generative artificial intelligence that, at this moment, dilutes the traditional research process.

Information literacy represents a complementary structural scheme to any research process, enabling individuals to identify, evaluate, and effectively use information in various forms and contexts. This approach focuses not only on acquiring technical skills but also on developing critical competences that enable individuals to navigate autonomously and reflexively in the vast world of information (Ford-Baxter et al., 2022).

One of the fundamental axes of any library is to satisfy the information needs of its users (Bopp & Smith, 2011). For this purpose, different actions are carried out focused on the information life cycle within a library, which includes the selection, acquisition, organization, communication, and use of documentary products through the different library services that link the user with the information sources (Nitecki, 1996; Webb et al., 2008).

At the beginning of the 20th century, the literature showed a centralized influence on enriching the bibliography of study plans and programs to satisfy the information needs of its users (Bopp & Smith, 2011). In the mid-twentieth century, the importance of including information literacy in the curricula was emphasized, so much so that different perspectives suggested that such inclusion was necessary for a library to be more functional (Knapp, 1966; Kellog, 1970; Pearson, 1978; Haeuser, 1979). Haeuser (1979) proposed that information literacy efforts should be directed toward the curriculum and that librarians should be involved in institutional decisions together with teachers since the librarian has direct contact not only with information in the process of selection and acquisition but is more capable of searching and retrieving information.

The emergence of library associations has played a fundamental role in information literacy by providing a framework for collaboration, knowledge sharing, and professional development for librarians, fostering the creation of policies and guidelines to guide information literacy programs and promoting best practices and the adoption of international standards that serve as the basis for better decisions (Sanches et al., 2022).

Including information literacy and other related literacies in the LIS curriculum is crucial for several reasons: 1) it equips students with skills to handle vast amounts of information and enables them to effectively locate, evaluate, and use information from various sources (Mutula et al., 2005); 2) they are essential skills for conducting research, making informed decisions, and solving problems (Mutula et al., 2005); 3) information literacy empowers students and professionals with critical thinking and the ability of interpreting information to make informed decisions and judgments (Eze & Aduba, 2022), which are skills that allow individuals to become more self-directed learners and take greater control over their learning process (Mutula et al., 2005); 4) the ability to cope with vast amounts of information and select the most appropriate is a valuable skill for academic and

professional success and growth (Pavloski & Dunder, 2015; Eze & Aduba, 2022); 5) it allows developing an understanding of the ethical and legal implications of information use (Mutula et al., 2005).

Elements of the information literacy curriculum

Current literature identifies the elements that researchers have suggested should be incorporated into the information literacy curriculum for LIS. These are organized and presented in this section under six categories: 1) curricular implementation and general challenges; 2) topics the curriculum must include; 3) inclusion of education-related topics; 4) integration of other literacies; 5) methodologies for the information literacy curriculum; and 6) workplace and social implications. It is essential to highlight that such a curriculum should aim to boost students' information literacy skills and train them as future information literacy trainers and advocates.

Curricular implementation and general challenges

The curricular implementation of information literacy in a LIS academic program might be done in different ways, which are not necessarily mutually exclusive:

- Through one or more dedicated compulsory courses during the academic program and providing information literacy courses during other LIS educational levels (bachelor, master's, and Ph.D.); that is, integrating information literacy throughout students' academic careers (Mutula et al., 2005). Introducing one or more information literacy courses might optimize information behavior and improve students' competences (Pavloski & Dunder, 2015)
- Set a transversal implementation of information literacy components in other courses during the LIS program, where the challenge would require an appropriate curricular design and for faculty to be aware of and promote the integration of such components in their courses; this is one of the reasons why faculty and administrators must perceive and accept information literacy as essential for higher education (Macklin & Culp, 2008)
- In addition, developing curricula that integrate information skills into all instructional programs (Islam & Tsuji, 2010), even for other disciplines. This could also help promote an effective and responsible use of information and information scientists' endeavors and might even result in a more information-literate society. Establishing a general information literacy course for the various disciplines taught in a university is seen by some information literacy advocates and researchers as its institutional *consecration* and acceptance, which is vital for establishing an information culture and good information habits and practices.

In any case, regarding the curricular implementation or its development, the following recommendations are relevant: 1) link theory with practice, practical experiences, and hands-on learning (Jain, 2017; Tucker, 2018); 2) implement curriculum sequencing based on constructivist principles and scaffolding, aiming to guide students to discover critical knowledge through a progressive learning process (Tucker, 2018); 3) a constructivist curriculum must focus on learners' understanding, prior knowledge, and experiential learning (Lantz & Brage, 2022); 4) consider the course's emphasis, as there are arguments against emphasizing specific skills and instead promoting understanding of how students engage with information in academic and professional contexts (Tucker, 2018). Regarding the challenges that the information literacy curriculum might face in its

implementation, we could find some misconceptions by faculty, such as them having the belief that students' existing skills are sufficient or even outstanding, but we can also find that students might be overconfident in their abilities (Macklin & Culp, 2008) and this might drive them to exhibit some attitudes that might not be ideal for learning. This issue around the misidentification or wrongful appreciation of skills has been debated around the notion of digital natives, for instance, which implies that younger generations are highly proficient with technology. This has started to be debunked, as such proficiency suddenly vanishes when young students have to use technologies for learning and working purposes.

Another challenge is related to institutional infrastructure or readiness, as there might be inadequate resources for teaching information literacy skills (Macklin & Culp, 2008), and for some institutions, it is very difficult to keep up with the latest information technologies (Islam & Tsuji, 2010). These issues may significantly affect an information literacy course, as it should incorporate specific subscription resources and technologies (software and hardware) to train students on the resources and tools they might need to use in the workplace.

Topics the curriculum must include

It may be appropriate to start with a conceptual level by examining the concepts around information literacy and its importance (Derakhshan et al., 2014; Eze & Aduba, 2022) as well as understanding data, information, and knowledge (Hernández-Pérez et al., 2011), a triad that is very typical of LIS courses. Then, we have the core information topics that are related to information seeking, access, retrieval, usage, evaluation, and communication; these include searching techniques and skills (Baro, 2011; Eze & Aduba, 2022), specifically formulating search queries (Rubiníc et al., 2013), information retrieval (Corrall, 2010), recognizing, defining and articulating the nature and extent of information needs (Igbinovia et al., 2020; Eze & Aduba, 2022), finding reliable and relevant information (Hernández-Pérez et al., 2011; Rubiníc et al., 2013; Pavloski & Dunder, 2015; Igbinovia et al., 2020), and searching, evaluating, and effectively using information (Hernández-Pérez et al., 2011; Rubiníc et al., 2013; Derakhshan et al., 2014; Pavloski & Dunder, 2015; Igbinovia et al., 2020). Moreover, some specific uses of information can include citing and referencing techniques (Mutula et al., 2005; Hernández-Pérez et al., 2011; Eze & Aduba, 2022), structuring term papers (Rubiníc et al., 2013) (also research papers, for that matter, as the training of scientists is a strong area of opportunity for providing advanced information literacy training), and using information for decision-making (Pavloski & Dunder, 2015).

Another essential part of the information literacy curriculum must include *everything there is to know* about searching, using, and evaluating information sources and resources (Corrall, 2010), such as using library resources (Baro, 2011), online resources (Baro, 2011; Eze & Aduba, 2022), search engines (Baro, 2011; Igbinovia et al., 2020), and online databases (Rubiníc et al., 2013; Igbinovia et al., 2020; Eze & Aduba, 2022). Additionally, the understanding of information resources and tools as well as documents must be more profound and thus should include recognizing how information is produced, organized, and disseminated (Igbinovia et al., 2020), identifying the characteristics and types of information sources and tools (Eze & Aduba, 2022), integrating technical, organizational, and operational content to understand the role of information in complex organizations (Mitchell, 2014b), and the navigation of digital information landscapes (Dodson, 2020).

A topic that has gained greater importance is the ethical use of information (Hernández-Pérez et al., 2011; Rubiníc et al., 2013; Derakhshan et al., 2014; Zhou et al., 2014; Grgic, 2017; Eze & Aduba, 2022; Adebayo & Alex-Nmecha, 2019), specifically understanding intellectual property rights (Hernández-Pérez et al., 2011; Eze & Aduba, 2022; Lantz & Brage, 2022), avoiding plagiarism (Hernández-Pérez et al., 2011; Grgic, 2017) and going deeper with plagiarism: understanding it, ways of avoiding it, its detection, procedures for cases of plagiarism, authorship criteria, definitions of authorship and authorship types, and learning about the ethical implications of using others' words, thoughts, or ideas without proper attribution (Eze & Aduba, 2022). Moreover, as this ethical dimension demonstrates, the treatment of information should be multidimensional and holistic, not only searching, retrieval, and evaluation, but it should include understanding the ethical, legal, political, and socio-economic facets of using information and information technologies (Igbinovia et al., 2020).

Other topics include knowledge organization, digital library management and research problems in information literacy (Corrall, 2010); investigating the level of information literacy between different groups (Derakhshan et al., 2014); developing information literacy models (Derakhshan et al., 2014); combating fake news and misinformation (Igbinovia et al., 2020); analyzing and tackling the challenges and solutions of teaching information literacy in STEM fields (Macklin & Culp, 2008); and research data management, altmetrics, mobile services, indexing and abstracting, and digitization (Adebayo & Alex-Nmecha, 2019) and born-digital documents.

Inclusion of education-related topics

The information literacy curriculum in LIS is not just about developing students' information literacy skills; it might consolidate them and take them to advanced levels, but this is about half of what this curriculum should achieve, as the other half involves preparing students to be future information literacy trainers and advocates. To achieve this latter half, it should include some topics and methodologies related to education (teaching, learning, didactics), particularly if there are no other courses in the LIS program about such topics.

Researchers suggest incorporating the following contents related to education: pedagogical approaches and the assessment of information literacy assignments and workshops using quasi-experimental designs (Johnston & Webber, 2004), collaborative pedagogy, implementing active and collaborative learning methods (Mutula et al., 2005); standards-based assessment practices, teaching practices, and incorporating activities that promote cognitive and technical skills development (Macklin & Culp, 2008); educational informatics and education for information literacy, and the development of skills in information literacy teaching, learning design, learning styles, and principles of instruction (Corrall, 2010); making learning and teaching interactive and recognizing diversity in learning styles (Islam & Tsuji, 2010); didactics in higher education (Meneses-Placeres & Frías-Guzmán, 2011); technology for implementing effective curriculum integration design (Mitchell, 2014a); and teaching techniques, learning methodologies and pedagogy (Dodson, 2020). The inclusion of these educational contents should have the purpose of allowing students, as future librarians, and information scientists, to become facilitators of lifelong and independent learning rather than keepers of information (Islam & Tsuji, 2010; Mammo, 2011; Zhou et al., 2014; Pavloski & Dunder, 2015; Dodson, 2020)

Integration of other literacies

In this entry, although we are not making strong distinctions among the vast number of literacies that have been proposed (e.g., academic literacy, algorithmic literacy, data literacy, financial literacy, health literacy, media literacy, multiliteracies, new literacies, new media literacies, numerical literacy, scientific literacy, statistical literacy, transliteracy, and visual literacy), we have taken the approach of dealing with the curriculum from the perspective of information literacy. However, with the understanding that this is the primary literacy in LIS, it is one of, if not the, oldest (dating back to the 1970s), nor is it mutually exclusive with other literacies. Hence, an information literacy course may incorporate others, especially digital literacy, scientific literacy, algorithmic literacy, media literacy, transliteracies, and multiliteracies, as they have unique elements that are relevant for future library and information scientists.

From the perspective of digital literacy, Ting-Yan & Li (2011) summarize the contents of the information literacy curriculum with an emphasis on information technology in four dimensions in the following way:

- Information consciousness: utilizes techniques, information, and software to make information technology a tool for self-actualization, essential in everyday life and learning.
- Information knowledge: understands the basics of computer operations and networking, as well as of the design, development, management, application, and assessment of information technology.
- Information competence: proficient in leveraging online resources for information retrieval, transmission, processing, and application. It also entails the skills for analyzing, processing, evaluating, creating, and designing information.
- Information morality: engages with information responsibly, adhering to legal and ethical standards, and embodying the role of a responsible user and producer (i.e., prosumer) of information.

Other authors recommend integrating the following topics and technologies related to digital literacy, which combines very well with information literacy to conform to a more complete literacy education (Novo, 2016), as its effective use can support independent and collaborative learning (Mei et al., 2016). Such topics can include cloud-based systems to develop their technology skills and expose them to information-sharing structures (Mitchell, 2014a; Mitchell, 2014b; Adebayo & Alex-Nmecha, 2019), using digital libraries to teach complex transdisciplinary skills by working "with diverse content, collection building, data modeling, IT application, and user service" (Mitchell, 2014a, p. 164), and the content, communication, analysis, searching, and evaluation independently of specific technologies (Baro, 2011). Other related themes include operating systems, office automation software, networks, databases, information system theory, computer hardware and software, internet programming, problem-solving skills using IT and software applications, and personal knowledge management tools (Zhou et al., 2014; Cerny, 2021). Among the most important things about advanced technologies is that library and information scientists must at least understand their types and differences and have a general understanding of how they work, how they are implemented, and how to use them to solve problems.

Jankowska et al. (2014) suggest incorporating sustainability content in literacy education, focusing on topics such as "open access to research, retaining author rights, institutional repository

use, public engagement in the community, environmental, social equity" (p. 48). Some researchers have been working under the term sustainability literacy (see, for example, Sekhar & Raina, 2021).

The inclusion of media literacy has also been mentioned to critically analyze and evaluate media messages and visual information (Mei et al., 2016; Lund & Wang, 2019). Also, multiliteracies (Meneses-Placeres & Frías-Guzmán, 2011) through the inclusion of content from various instructional settings to help students connect information in new and meaningful ways. This involves developing multi-literacies and highlighting the interconnectedness of knowledge across disciplines (Mitchell, 2014a).

Other related literacies include developing skills supporting intercultural communication in e-learning, such as self-reflection and cooperation (Uukkivi, 2016), visual literacy (Lund & Wang, 2019), data literacy (Cerny, 2021), programming and algorithmic thinking (Cerny, 2021), and transliteracy (Lantz & Brage, 2022).

Methodologies for the information literacy curriculum

Regarding the teaching and learning methods to incorporate for students to learn under the information literacy curriculum, and most importantly, the methods that they can replicate in the future to continue teaching about information literacy are diverse and include problem-solving and critical thinking skills (Macklin & Culp, 2008; Baro, 2011; Novo, 2016; Lantz & Brage, 2022), reflective practice (Corrall, 2010), developing higher-order thinking skills such as negotiation, comprising, comparing, analyzing, and synthesizing (Rubiníc et al., 2013; Eze & Aduba, 2022), developing students' competences for learning to learn (Rubiníc et al., 2013), incorporating practical education such as internships to prepare students for future employment (Pavloski & Dunder, 2015), library activities based on a user-centered information environment (Pavloski & Dunder, 2015), information literacy strategies to enhance information behavior patterns in students and promote independent information seeking (Pavloski & Dunder, 2015; Eze & Aduba, 2022), organizing ideas, building knowledge together, debating thematic content, and sharing resources (Novo, 2016), systems thinking (Lantz & Brage, 2022), and writing skills to improve students' ability to analyze and use information effectively (Uukkivi, 2016; Lantz & Brage, 2022).

As stated before, another area of opportunity is embedding research methods and processes in the information literacy curriculum, focusing on the connections between research, writing, and information literacy, emphasizing critical thinking, reflection, and active learning (Corrall, 2010; Baro, 2011; Lantz & Brage, 2022; Eze & Aduba, 2022; Lantz & Brage, 2022); and incorporate open experiments and independent research to improve practical abilities (Zhou et al., 2014).

One approach worth mentioning is that of Olson et al. (2023), who developed research in the health sciences based on the instructional design technique called curriculum mapping under four fundamental axes: what, when, how it is taught, and how it is evaluated. This allows the development of a modular structure that provides greater strength to information literacy programs and guarantees transparency, long-term stability, and the promotion of good practices.

A holistic approach to teaching information literacy is through the informed learning theory. This implies reflecting on personal experiences of using information to learn, applying alternative ways of using information to learn through practical design, exploring different information literacy

models and frameworks, considering the *seven faces of information literacy*, engaging with diverse student populations, addressing the digital skills imbalance, promoting inclusive approaches, and enhancing teaching through informed learning in online and blended learning environments (Hughes & Bruce, 2012).

Further teaching and learning methods involve integrating assignments, readings, and various media formats, including video, sound, and social media into the curriculum to prepare students for the digital age (Tucker, 2018; Lantz & Brage, 2022). Some creative and collaborative strategies can be incorporated, such as reflective writing, peer learning and discussions, and maximize opportunities for students to discover critical understandings independently and facilitate interactive learning through discussions (Tucker, 2018). Finally, Cerny (2021) recommends focusing on five dimensions of competence: "information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving" (p. 3).

Workplace and social implications

Workplace implications include implementing information literacy and knowledge management in the workplace (Johnston & Webber, 2004), threshold learning and the experience of information, which is how information professionals understand and interact with a digital environment (Tucker, 2018), develop the necessary skills to thrive in the information age and contribute to the sustainable competitiveness of innovative talents (Mei et al., 2016), and emphasizing the importance of self-directed learning to strengthen personal development and specific learning competences (Cerny, 2021).

Regarding the social implications of information literacy and the importance of its curriculum beyond the classroom and the LIS program involves conceiving information literacy as a discipline for the information society and age (Johnston & Webber, 2004; Mammo, 2011), developing a curriculum responsive to local conditions in which professionals may act positively (Mammo, 2011), and cultivating innovative talents with higher information literacy skills and innovation abilities to meet the demands of the knowledge economy (Mei et al., 2016). Moreover, higher importance has been placed on literacy education for marginalized and rural communities, which should include knowledge about the culture of indigenous communities, their livelihoods, legal and historical relationships, systems of governance, infrastructure, technology and educational resources, literacy rate, education offered locally, barriers to communication and exchange, and the wants and needs of the community from the nation-state and technological societies (Chester & Neelameghan, 2006). LIS professionals may act to help preserve their cultural and knowledge heritage, develop community knowledge management, and implement information and communication technologies to bridge the digital divide, all of which may help empower these communities. Finally, LIS professionals dedicated to information literacy should also be advocates; this could lead them to "work with education departments, government bodies and community organizations to establish policies and set national and regional goals for information skills acquisition for all levels of the population" (Rader, 2002, cited by Islam & Tsuji, 2010, p. 311).

Information literacy in library and information science academic programs

This section presents the summary of a non-exhaustive revision of LIS programs that include information literacy. From 41 reviewed programs, we found that 23 included information literacy in

some form. They are divided into the following three categories: 1) LIS programs that include an information literacy course (9 courses in 9 programs); 2) LIS programs that include courses on other types of literacies (2 courses in 2 programs); and 3) Courses on other subjects that include some information literacy contents (12 courses in 11 programs, one of these programs has two related courses, while another program centers its first year on information literacy, critical analysis, and problem-solving). The details provided in the following summary were limited by the level of access offered on the specific websites of the programs analyzed, as in some cases, only the names of the courses are provided. In contrast, others offer an explicit and complete description of each course. First, the LIS programs that include an information literacy course are the following (in no particular order):

- The Bachelor's Degree in Documentary Information Science at Universidad Autónoma del Estado de México (2018) offers an *Information Literacy* course.
- The Bachelor's Degree in Information Management at Universidad Autónoma de San Luis Potosí (2019) has an *Information Literacy* course.
- The Bachelor's Degree in Library Science and Knowledge Management at the University of Guadalajara (2023) offers the course *Epistemological Foundations of Information and Informatics Competencies* course.
- Bachelor's Degree in Information Science at Universidad Autónoma de Chihuahua (2022): the Information *Literacy* course intends for students to be able to train independent and critical users, support lifelong learning, inform citizens, and make individuals effectively use information resources at their disposal. As such, this course provides students with the theoretical and methodological tools necessary to develop information literacy initiatives, which may include comprehensive programs, workshops, courses, promotional materials, and support resources. Students must design and implement an information literacy initiative, including its theoretical, methodological, data collection, and analysis components, and generate a series of resources to support it.
- Master's Degree in Library and Information Services Management at Sheffield University (2023): the *Information Literacy* course includes the concepts of information literacy and information behavior and is intended for students to develop their skills and approaches to teaching them.
- BSc Information and Library Studies at Aberystwyth University (2024): the course on *Information Literacy* includes information literacy definitions, theories of information literacy and information-seeking, the process of locating and using information sources, user orientation, solving information problems, coping with information overload, and communicating information literacy skills to others.
- Bachelor of Library & Information Science at Makerere University (2011): the *Information Literacy* course equips students with the skills to identify information tasks, search for information, retrieve it, use it, cite it, and present it as higher education students.
- Master of Science in Information Studies at the University of Texas at Austin (2022): the *Library Instruction and Information Literacy* course familiarizes students with the theories

and history of library instruction, including some didactic contents such as learning theory, learning styles, culturally responsive pedagogy, instructional delivery modes and materials, and learning evaluation. There is an emphasis on assisting users in evaluating misinformation, working with ACRL's *Framework for Information Literacy for Higher Education*, developing instructional design, planning, implementing, and assessing library instruction activities, including developing exercises, formal lectures, and demonstrations.

- Bachelor of Library and Information Science at the University of the Philippines (2019): the course on Information Literacy emphasizes its relevance to lifelong learning and its importance for society.

The following LIS programs include courses on other types of literacies:

- Bachelor of Science in Information Science at the University of Northern Texas (2023): the *Media Literacy* course examines the operations, responsibilities, and societal roles of mass media from the viewpoint of the audience. It covers the ethical challenges encountered by various media forms and explores how political, economic, and cultural influences affect media functionality. Additionally, the curriculum investigates the processes behind media production, how audiences decipher media messages, and the significance of varying degrees of media literacy among individuals on civic engagement, socioeconomic matters, and communication phenomena.
- Master of Library & Information Studies at University College Dublin (2022): the course on *Digital Media Literacy* develops students as media-literate citizens by improving their digital and media literacy skills, including identifying factual information, malicious information, and misinformation; making informed decisions and challenging views; knowing about information ethics, with an emphasis on life and work environments. Students must design, develop, and present media literacy awareness and training initiatives.

Finally, the programs that offer courses on other subjects but that include some information literacy contents are the following:

- Information Science Degree at Cornell University (2023): the *Information, Ethics, Law and Policy* course investigates the ethical, legal, and social foundation of information.
- Master's Degree in Library and Information Studies at Universidad Nacional Autónoma de México (UNAM, 2013): the *User Education* course includes: 1) training in the use of information; 2) conceptualization of the information training process; 3) information literacy; 4) information skills; and 5) standards to develop information skills.
- Bachelor's Degree in Library and Information Studies at UNAM (2014): the *Information Users* course tasks students with designing an information literacy program to be applied in a specific institution or community based on a user study.
- Bachelor's Degree in Librarianship and Information Science at Universidad Nacional Mayor de San Marcos (2021): the *Services in Information Units* course includes information literacy as a transversal topic within the general themes of the course related to information services, their design, evaluation, and implementation.

- Information Studies degree at Aalborg University (2024): the Computational Thinking—Creative Computing for All course involves solving problems, designing systems, and understanding human behavior. It improves students' computer literacy and is interested in assessing the impact of digital creations on the academic field.
- Master of Information Studies at Victoria University of Wellington (2024): the course on *Information Access and Use* includes the following topics: 1) information behavior theories and models; 2) information seeking; 3) information literacy; 4) evaluating information; and 5) teaching and learning. The main objectives of the course, related to information literacy, include analyzing information seeking and use in terms of instruction and helping users locate and use information effectively.
- Bachelor's Degree in Library and Information Science at Humboldt-Universität zu Berlin (2021): the *Didactics of Information* course centers on didactic concepts and models for transmitting content and competences in information science and seeks to develop skills in planning, implementing, and evaluating didactic services. It includes topics such as didactic teaching methods, information literacy, data literacy, and media literacy.
- Master of Information Studies at McGill University (2022): the course on *Information Behavior and Resources* introduces students to information behavior, information needs assessment, information search strategies, and user-focused information sources and services. Related learning outcomes include assessing information needs, designing and using basic and advanced search strategies, and matching information resources to information needs.
- MA on Digital Media & Information Studies at the University of Glasgow (2024): the first year of this master's program focuses on information literacy, critical analysis, and problem-solving.
- Master of Library and Information Science Program at Rutgers University (2005): has two related courses, *Principles of Searching* and *Search Strategy*, which center on searching within a variety of information resources, information retrieval, Boolean logic, search engines, search strategies, presentation, and the evaluation of search results, interactive processes in human information seeking, and developing need analysis, mediation, and interviewing skills.
- Bachelor's Degree in Library and Information at Universidad Carlos III de Madrid (2024): the course on *Information Seeking and Retrieval* focuses on theoretical Information Retrieval frameworks, information retrieval in databases, Boolean and other retrieval models, and the evaluation of information retrieval's effectiveness.
- Bachelor's Degree in Information Science at the University of Pretoria (2021): the *Academic Information Management* course emphasizes finding, evaluating, processing, managing, and presenting information resources for academic purposes using digital technologies.

We can conclude this section by stressing that the implementation of information literacy in the LIS curriculum might be done under at least three main perspectives, which are not necessarily mutually exclusive:

1) A general course that intends to develop students' information literacy skills (which, in the previous section, we described as *half* the purpose of an information literacy curriculum).

2) A specialized information literacy course (or several sequential courses) that consolidates students' information literacy skills but is focused mainly on teaching how to transfer and develop such skills to other people; hence, they might include contents about teaching, learning, and education. This could arguably be the ideal solution, but from the non-exhaustive analysis of international programs presented above, there are seven that match this type and might arguably be the most complete of the programs analyzed. Such are those from the following universities (chronological-alphabetical order): UNAM (2014); Humboldt-Universität zu Berlin (2021); Universidad Autónoma de Chihuahua (2022); University College Dublin (2022); University of Texas at Austin (2022); Sheffield University (2023); and Aberystwyth University (2024).

3) Programs without any courses dedicated or even related to information literacy, where students must acquire such skills throughout the whole curriculum and course-related activities. These programs would be either intentionally or unintentionally designed in this way, although there is also the possibility that information literacy is not considered whatsoever.

Future Perspectives

The inclusion of information literacy in the curriculum requires: 1) recognizing the importance of collaboration between librarians, educators, and subject experts; 2) advocating for its importance in enhancing instruction and student learning outcomes, as well as considering how relevant it is for society to count with LIS professionals capable of developing the information literacy skills of diverse groups; 3) a greater awareness of information literacy standards and the different teaching approaches that can be incorporated; and 4) incorporating topics such as how to determine information needs, providing solutions through discussing the social aspects and implications of information literacy (Macklin & Culp, 2008; Rubinić et al., 2013; Derakhshan et al., 2014; Novo, 2016).

As we have stated before, the implementation of information literacy in the LIS curriculum might happen in at least three forms: 1) in a specific course to develop students' information literacy skills; 2) through a specialized course that consolidates such skills but that mainly aims to provide students with the tools to teach these skills to other people; and 3) having no particular information literacy course and hope that students develop their information literacy skills throughout the whole curriculum and then arrive at the realization that they can teach these skills to others. The second option might be the best. However, LIS curricula should be planned in such a way that all courses contribute to progressively developing a LIS professional with very advanced information literacy skills and competences, which will be then consolidated in an information literacy course that will center on the educational methods and tools they need to become an information literacy trainer. Current and future LIS professionals who are familiar with the value of information literacy and its related topics will also harness any opportunities to push for its inclusion in other disciplines and institutions, even outside higher education.

Conclusion

One of the most significant benefits of implementing information literacy programs is the promotion of user autonomy for research processes, the development of academic skills in a more comprehensive way for the acquisition of knowledge, strengthening the ability of individuals to face the challenges of a constantly evolving digital environment, allowing them not only to access information efficiently, but also to analyze it holistically, leaving them with a significant learning experience for the rest of their lives.

This autonomy in research benefits information users in their academic environment and provides them with valuable tools for their personal and professional development. It enables them to deal more competently with the challenges of today's world, characterized by an overabundance of information and the need for discernment and critical thinking.

Successful initiatives in different areas and disciplines based on curriculum mapping show that the stability of information literacy programs can be thus guaranteed (Rowley et al., 2020; Benallack & Rundels, 2021; Khailova, 2021; Olson et al., 2023). However, in their systematic review and meta-analysis, Derakhshan & Singh (2011) revealed a scarcity of knowledge about training areas in LIS.

There are notable success stories that can serve as examples for future implementations. One aspect that should be highlighted is the profile of the future information literacy practitioner; there is a great need for better profiles that integrate different literacies in more comprehensive training.

References

Adebayo, J. O., & Alex-Nmecha, J. (2019). Survey of library and information science education in Nigeria: The case of two LIS schools. *Library Philosophy and Practice*, *2019*. https://digitalcommons.unl.edu/libphilprac/2819/

Baro, E. E. (2011). A survey of information literacy education in library schools in Africa. *Library Review*, *60*(3), 202–217. https://doi.org/10.1108/00242531111117263

Benallack, C., & Rundels, J. J. (2021). Mapping the framework to credit-bearing information literacy courses. *The Journal of Academic Librarianship, 47*(6), 102455. https://doi.org/10.1016/j.acalib.2021.102455

Bopp, R. E., & Smith, L. C. (2011). *Reference and information services: An introduction*. Bloomsbury Publishing USA.

Cerny, M. (2021). Digital competences of students of library studies: Comparison of research results for 2018–2020. *Education Sciences*, *11*(11). https://doi.org/10.3390/educsci11110729

Chester, G., & Neelameghan, A. (2006). Information professional: Knowledge and skills development for serving marginalized and rural communities. *Webology*, *3*(3), 1–5. https://www.webology.org/abstract.php?id=72

Corrall, S. (2010). Educating the academic librarian as a blended professional: A review and case study. *Library Management*, *31*(8), 567–593. https://doi.org/10.1108/01435121011093360

Derakhshan, M., & Singh, D. (2011). Integration of information literacy into the curriculum: A meta-synthesis. *Library Review, 60*(3), 218-229. https://doi.org/10.1108/00242531111117272

Derakhshan, M., Singh, D., & Nazari, M. (2014). The contributions of library and information science education to the development of competencies in determining information needs: An iranian case study. *Libri*, *64*(2), 144–154. https://doi.org/10.1515/libri-2014-0012

Dodson, M. (2020). On target or missing the mark? Instruction courses in LIS graduate programs. *Public Services Quarterly*, *16*(2), 83–94. https://doi.org/10.1080/15228959.2020.1745131

Eze, M. E., & Aduba, D. E. (2022). An investigation into information literacy education in library schools in Nigeria. *Journal of Information Literacy*, *16*(1), 108–118. https://doi.org/10.11645/16.1.2948

Ford-Baxter, T., Faulkner, K., & Masunaga, J. (2022). Situating Information Literacy: A Case Study Exploring Faculty Knowledge of National Disciplinary Standards and Local Program Learning Outcomes. *The Journal of Academic Librarianship, 48*(3), 102523. https://doi.org/10.1016/j.acalib.2022.102523

Grgic, I. H. (2017). LIS students and plagiarism in the networked environment. In *2017 40th International Convention on Information and Communication Technology, Electronics and Microelectronics, MIPRO 2017 - Proceedings* (pp. 842–847). https://doi.org/10.23919/MIPRO.2017.7973538

Haeuser, M. J. (1979). Curriculum reform: A role for librarians. In National Conference of the Association of College and Research Libraries (pp. 238-240). K.G. Saur.

Hernández-Perez, T., Pacios, A. R., Vianelllo, M., Aguilera Ortega, R., & Ramos Gorospe, M. (2011). La formación en alfabetización en información en las aulas universitarias: el caso de la UC3M. *Scire: Representación y Organización del Conocimiento*, *17*(2), 27–37. https://doi.org/10.54886/scire.v17i2.3927

Hughes, H., & Bruce, C. (2012). Snapshots of informed learning: LIS and beyond. *Education for Information*, *29*(3–4), 253–269. https://doi.org/10.3233/EFI-130940

Igbinovia, M. O., Okuonghae, O., & Adebayo, J. O. (2020). Information literacy competence in curtailing fake news about the COVID-19 pandemic among undergraduates in Nigeria. *Reference Services Review*, *49*(1), 3–18. https://doi.org/10.1108/RSR-06-2020-0037

Islam, M. A., & Tsuji, K. (2010). Assessing information literacy competency of Information Science and Library Management graduate students of Dhaka University. *IFLA Journal*, *36*(4), 300–316. https://doi.org/10.1177/0340035210388243

Jain, P. (2017). Delivery of library and information science curriculum: A joint endeavour among LIS educators and library practitioners at the University of Botswana. *Library Review*, *66*(6–7), 482–504. https://doi.org/10.1108/LR-12-2016-0109

Jankowska, M. A., Smith, B. J., & Buehler, M. A. (2014). Engagement of academic libraries and information science schools in creating curriculum for sustainability: An exploratory study. *Journal of Academic Librarianship*, *40*(1), 45–54. https://doi.org/10.1016/j.acalib.2013.10.013

Johnston, B., & Webber, S. (2004). The role of LIS faculty in the information literate university: Taking over the academy? *New Library World*, *105*, 12–20. https://doi.org/10.1108/03074800410515237

Kellog, G. B. (1970). *Role of the librarian and curriculum change*. Fresno State College. https://scholarworks.calstate.edu/downloads/td96k362z

Khailova, L. (2021). Using curriculum mapping to scaffold and equitably distribute information literacy instruction for graduate professional studies programs. *The Journal of Academic Librarianship, 47*(1), 102281. https://doi.org/10.1016/j.acalib.2020.102281

Knapp, P. B. (1966). *The Monteith College library experiment*. Scarecrow Press.

Lantz, A., & Brage, C. (2013). Applied information literacy and learning: Curriculum development for the next decade. *Communications in Computer and Information Science*, *397*, 359–365. https://doi.org/10.1007/978-3-319-03919-0_47

Lund, B., & Wang, T. (2019). A comparative analysis of instructional course themes in LIS and museum studies programs in the USA. *Information and Learning Science*, *120*(7–8), 426–450. https://doi.org/10.1108/ILS-03-2019-0016

Macklin, A. S., & Culp, F. B. (2008). Information literacy instruction: Competencies, caveats, and a call to action. *Science and Technology Libraries*, *28*(1–2), 45–61. https://doi.org/10.1080/01942620802096895

Mammo, Y. (2011). Rebirth of library and information science education in Ethiopia: Retrospectives and prospectives. *International Information and Library Review*, *43*(2), 110–120. https://doi.org/10.1080/10572317.2011.10762886

Mei, L., Qi, L., & Zhang, Y. (2016). Blended Learning Models for Information Technology Education as General Course for College Students. In *Proceedings - 2015 International Symposium on Educational Technology, ISET 2015* (pp. 47–51). IEEE. https://doi.org/10.1109/ISET.2015.18

Meneses-Placeres, G., & Frías-Guzmán, M. (2011). La alfabetización informacional en los procesos curriculares de las ciencias de la información en Cuba. *Revista Interamericana de Bibliotecologia*, *34*(1), 9–22. https://doi.org/10.17533/udea.rib.9486

Mitchell, E. (2014a). Trending tech services: Library and IT curriculum integration Part I. The case for a designed curriculum. *Technical Services Quarterly*, *31*(2), 161–172. https://doi.org/10.1080/07317131.2014.875380

Mitchell, E. (2014b). Trending Tech Services: Library and IT Curriculum Integration, Part II: Supporting learning through virtual computing. *Technical Services Quarterly*, *31*(3), 248–263. https://doi.org/10.1080/07317131.2014.908590

Mutula, S. M., Wamukoya, J., & Zulu, S. F. (2005). An evaluation of information literacy competencies amongst library and information science students at the university of Botswana. *Journal of Interlibrary Loan, Document Delivery and Electronic Reserve*, *15*(3), 77–93. https://doi.org/10.1300/J474v15n03_08

Nitecki, D. A. (1996). Changing the concept and measure of service quality in academic libraries. *The Journal of Academic Librarianship, 22*(3), 181-190. https://www.sciencedirect.com/science/article/pii/S0099133396900567

Novo, A., Bastos, G., & Vasconcelos, A. I. (2016). Effects of a virtual learning environment on librarians' information literacy and digital literacy competences. *Communications in Computer and Information Science, 676*, 655-664. https://doi.org/10.1007/978-3-319-52162-6_64

Olson, D., Bates, S. L., Yarbrough, S., Westall, S., Denis, M. K. C., & Barnett, M. (2023). Information literacy curriculum mapping in the health sciences: A scoping review. *Journal of Information Literacy, 17*(1), 1. https://doi.org/10.11645/17.1.3319

Pavlovski, M., & Dunder, I. (2015). Information literacy assessment at the University of Zagreb: An undergraduate students' perspective. In *2015 38th International Convention on Information and Communication Technology, Electronics and Microelectronics, MIPRO 2015 - Proceedings*, *May* (pp. 695-699). IEEE. https://doi.org/10.1109/MIPRO.2015.7160361

Pearson, L. (1978). What has the library done for you lately? *Improving College and University Teaching, 26*(4), 219-221. https://doi.org/10.1080/00193089.1978.9927582

Rowley, E., Kuryloski, L., & Moore, K. (2020). Extending the role of the library and librarian: Integrating alternative information literacy into the engineering curriculum. In *2020 ASEE Virtual Annual Conference Content Access Proceedings*, 34656. University at Buffalo. https://doi.org/10.18260/1-2--34656

Rubinić, D., Stričević, I., & Juric, M. (2013). Information literacy course: The perception of students and professors: University of Zadar case. *Communications in Computer and Information Science, 397*, 528–534. https://doi.org/10.1007/978-3-319-03919-0_71

Sanches, T., Antunes, M. L., & Lopes, C. (2022). International standards for information literacy: The inspiration for national practices. *LIBER Quarterly: The Journal of the Association of European Research Libraries, 32*(1), Article 1. https://doi.org/10.53377/lq.11131

Sekhar, C., & Raina, R. (2021). Towards more sustainable future: Assessment of sustainability literacy among the future managers in India. *Environment, Development and Sustainability*, *23*(11), 15830–15856. https://doi.org/10.1007/s10668-021-01316-0

Ting-Yan, B., & Li, L. (2011). Research on construction of information literacy curriculum system in colleges. *ICCSE 2011 - 6th International Conference on Computer Science and Education, Final Program and Proceedings*, *ICCSE* (pp. 799–803). IEEE. https://doi.org/10.1109/ICCSE.2011.6028758

Tucker, V. M. (2018). Threshold Concepts and Information Experience in IL Professional Education: Curriculum Design for Online Learning. *Communications in Computer and Information Science*, *810*, 749–758. https://doi.org/10.1007/978-3-319-74334-9_76

Uukkivi, A. (2016). Personal factors supporting intercultural communication in e-learning of information sciences. *Library Review*, *65*(1–2), 20–32. https://doi.org/10.1108/LR-01-2015-0002

Webb, J., Gannon-Leary, P., & Bent, M. (2008). *Providing effective library services for research*. Facet.

Zhou, Y., Wang, B., & Ju, C. (2014). The cultivating of information literacy and information technology in a classification talent training system. *World Transactions on Engineering and Technology Education*, *12*(1), 43–48. http://www.wiete.com.au/journals/WTE&TE/Pages/Vol.12,%20No.1%20(2014)/07-Zhou-Y.pdf

Library and Information Science programs cited

Aalborg University. (2024). *Information Studies*. Aalborg University. https://www.en.aau.dk/education/master/information-studies#semester-4:-master%E2%80%99s-thesis

Aberystwyth University. (2024). *BSc Information and Library Studies*. https://courses.aber.ac.uk/undergraduate/information-library-studies-distance-learning

Cornell University. (2023). *Information Science Program.* https://infosci.cornell.edu

Humboldt-Universität zu Berlin. (2021). *Information about the BA Programme in Library and Information Science*. https://www.ibi.hu-berlin.de/en/teaching/study-programs/bachelor

Makerere University. (2011). *Bachelor of Library & Information Science*. https://courses.mak.ac.ug/programmes/bachelor-library-information-science

McGill University. (2022). *Master of Information Studies Courses and Outlines*. https://www.mcgill.ca/sis/programs/mist/courses-and-outlines

Rutgers University. (2005). *Master of Library and Information Science Program*. https://catalogs.rutgers.edu/generated/scils_0305/pg4894.html

Sheffield University. (2023). *Library and Information Services Management*. Sheffield University. https://www.sheffield.ac.uk/postgraduate/taught/courses/2024/library-and-information-services-management-distance-learning-ma-pg-certificate-pg-diploma#modules

Universidad Autónoma de Chihuahua. (2022). *Plan de estudios Licenciatura en Ciencias de la Información.* UACH. https://uach.mx/pregrado/licenciado-ciencias-informacion/plan-de-estudios/

Universidad Autónoma de San Luis Potosí. (2019). *Licenciatura en Gestión Documental y Archivística.* https://www.fci.uaslp.mx/ProgramasAcademicos/Detalle/22#gsc.tab=0

Universidad Autónoma del Estado de México. (2018). *Licenciatura en Ciencias de la Información Documental*. http://denms.uaemex.mx/exporientavirtual/?courses=licenciado-en-ciencias-de-la-informacion-documental

Universidad Carlos III de Madrid. (2024). *Bachelor's Degree in Library and Information*. https://www.uc3m.es/ss/Satellite/Grado/en/TextoMixta/1371215057480/?d=Touch

Universidad de Guadalajara. (2023). *Licenciatura en Bibliotecología y Gestión del Conocimiento. https://www.udgvirtual.udg.mx/lbgc*

Universidad Nacional Autónoma de México. (2014). *Licenciatura en Bibliotecología y Estudios de la Información.* https://escolar1.unam.mx/planes/f_filosofia/Biblio.pdf

Universidad Nacional Autónoma de México. (2013). *Maestría en Bibliotecología y Estudios de la Información*. https://www.posgrado.unam.mx/programa/bibliotecologia-y-estudios-de-la-informacion-maestria

Universidad Nacional Mayor de San Marcos. (2021). *Plan de Estudio: Escuela Profesional de Bibliotecología y Ciencias de la Información*. https://letras.unmsm.edu.pe/plan-de-estudio-e-p-de-bibliotecologia-y-ciencias-de-la-informacion

University College Dublin. (2022). *MLIS Library & Information Studies*. https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=PROG&MAJR=W006

University of Glasgow. (2024). *Digital Media & Information Studies*. https://www.gla.ac.uk/undergraduate/degrees/digitalmedia/#tab=structure,coursedetails

University of Northern Texas. (2023). *Bachelor of Science in Information Science*. https://informationscience.unt.edu/bsis

University of Pretoria. (2021). *BIS Information Science*. https://www.up.ac.za/information-science/article/1821926/bis-specialising-in-information-science

University of Texas at Austin. (2022). *Master of Science in Information Studies*. https://www.ischool.utexas.edu/programs/master-science-information-studies

University of the Philippines. (2019). *Bachelor of Library and Information Science*. https://upslis.info/studywithus

Victoria University of Wellington (2024). *Master of Information Studies.* https://www.wgtn.ac.nz/explore/postgraduate-programmes/master-of-information-studies/requirements?programme=master-of-information-studies&international=true

See also

20034. Workplace Information Literacy

30022. Education

30039. Information literacy for lifelong learning

30043. Library and Information Science Education

30044. History of Information Literacy

30045. Information literacy, libraries, librarianship and information services

50001. History of LIS Education

50009. LIS Postsecondary and Undergraduate Education

50016. Competency-Based Education (CBE) and Information Literacy

60031. Information Literacy