Digital Library Education in Europe: A Survey

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Abstract

Research in digital libraries (DLs) has gained much interest across the globe. Most funding related to DL are available for building DLs, rather than producing digital librarians by developing the DL curricula and offering necessary funding to introduce state-of-the-art DL labs for future library professionals. Based on online surveys, this article investigates the status of DL education/courses in Europe, particularly, it examines the curriculum contents of DL courses, explores the future direction of library and information science (LIS) curricula, and identifies the competitors of LIS schools in the DL world. This study received responses from 54 LIS schools/departments in 27 European countries. The results of the current study clearly show that the majority of the LIS schools have already integrated digital librarianship in their regular bachelor's and master's degree programs. The importance of practical aspects in DL curricula has been highlighted by the authors. The study also reports the recommended books and journals on DL, direction of LIS curricula, and the competitors of LIS schools in the digital world. A number of future research directions have been offered by the authors. The authors expect that the study will contribute to the discussions and debates toward identifying subject elements for DL courses. The top subject areas based on their importance as reported by the participants of the current study should be taken into consideration before designing curricula for DLs and before developing a Europe-wide unique LIS curriculum.

Introduction

Research in digital libraries (DLs) has gained much interest across the globe. Since the early 1990s, a significant amount of money has been invested in DL research (Pomerantz, Abbas, & Mostafa, 2009; Pomerantz, Oh, Yang, Fox, & Wildemuth, 2006). Many governments in different countries across the world have invested in building their national DLs. However, in the United States, DL research has attracted much more attention and funding than other parts of the world. A significant number of grants are awarded in the United States to collaborative DL education projects. For example, Institute of Museum and Library Services (IMLS) and the National Science Foundation (NSF) granted a number of collaborative DL education projects in the United States. A very highly significant DL curriculum project of Virginia Tech (VT) and the University of North Carolina (UNC) was granted a 3-year grant of over half a million dollars in 2006. It is perhaps the first formal cooperation in this field between computer science (CS) and library and information science (LIS) and between institutions (Ma, Clegg, & O'Brien, 2009). This curriculum project has affected LIS curriculum and teaching, in particular

DL curriculum across the world. Readers interested in knowing more about the curriculum can read works of Oh, Yang, Pomerantz, Wildemuth, and Fox (2015) and Yang, Wildemuth, Pomerantz, Oh, and Fox (2009) and can check their website at http://curric.dlib.vt.edu/

In Europe, there have been several projects and funding nationally and locally that focus on DL development. The European Commission's (EC 2009) i2010 DLs initiative was launched in September 2005 suggesting the creation of a European DL and the promotion of Europe-wide DL initiatives. In November 2008, Europeana—Europe's online library, museum, and archive—was opened to make Europe's rich cultural and scientific heritage accessible to all over the Internet.

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In Europe, in recognition of the importance of DL education, EC introduced EC-financed Erasmus Mundus *International Master in Digital Library Learning* (DILL) in 2007. EC financed this program for the five consecutive years. Initially, DILL was managed by three European LIS schools, that is, Oslo and Akershus University College of Applied Sciences, Norway; Tallinn University, Estonia; and Parma University, Italy. From 2015, DILL is now managed by Tallinn University, Estonia, and Parma University, Italy. Oslo and Akershus University College of Applied Sciences is no more a partner of DILL. Although the EC deserves appreciation for introducing such an internationally recognized, highly acclaimed, first program of this type on DL education, it did not extend the funding support after fifth intake. In an effort to encourage international students to gain DL expertise at two European LIS schools, the DILL administration reduced the tuition fees recently. Nonetheless, many students from developing countries still would not be able to bear the expenses of studying at European institutions due to high cost of living. There are very few such examples of fully fledged programs on digital librarianship in Europe.

It is evident in the literature on DLs such as Pomerantz et al. (2006) and Pomerantz et al. (2009) that most funding related to DLs are available for building DLs, rather than producing digital librarians by developing the DL curriculum and offering necessary funding to introduce state-of-the-art DL lab for future library professionals.

This article investigates the status of DL education/courses in Europe, particularly, it examines the curriculum contents of DL courses and future direction of LIS curricula, identifies the competitors of LIS schools in the DL world, and so forth. Finally, based on the online survey results, this article offers guidelines for future curriculum development in European LIS schools.

Problem Statement

Kajberg and Lørring (2005) highlighted the importance of joint curriculum development and collaboration and cooperation among LIS schools in Europe to offer enhanced, quality LIS education in Europe. DL is an area where the LIS schools in Europe can work together to create a standard curriculum for LIS schools in Europe. Moreover, LIS schools can also collaborate with CS, management, and business schools to build an interdisciplinary DL curriculum.

The first step to collaboration with other LIS schools in Europe would be to know their curricula and schools' strengths. European countries vary from each other due to their diverse cultural, historical, and language backgrounds. Naturally, LIS schools in Europe have different curriculum concentrations. Due to language variances, it is not possible for any individual researcher to examine the curriculum contents of the LIS programs based on their curricula available online. The websites of many European countries are in their local languages and many LIS schools have not uploaded their curricula online. Therefore, it is not even possible for

anyone to know the LIS courses and their curricula due to language barriers. In such a situation, the authors of this article decided to use online surveys to acquire an understanding of the core curriculum contents of the LIS schools on DL courses. The heads of the LIS departments/schools are the right persons to contact as they are responsible for overseeing LIS schools' activities and have information about their curricula and future planned initiatives.

A number of studies, such as Spink and Cool (1999), Saracevic and Dalbello (2001), Liu (2004), and Ma, Clegg, and O'Brien (2006), focus on exploring DL courses in various schools around the world and explore course contents and related things. The majority of the research on DL is conducted in the United States, the United Kingdom, and Canada. Very little has been done in Europe that illustrates the DL education status in the European context. Although there might be studies conducted in languages other than in English that talk about the importance of DLs in the LIS curriculum, this study is unable to account for them. A study by Koltay and Boda (2008) investigated the status of DL concepts in the Hungarian LIS curriculum. However, Tammaro (2007) offered several broad models of DL courses. A study by Larsen (2005) offers a brief overview of the LIS curriculum in European LIS schools, although no focus has been given to examine the DL education–related aspects. What is the status of DL courses in LIS schools in Europe? What are the major curriculum contents of DL courses in European LIS schools? What is the future direction of the LIS curriculum? Do LIS faculty members in Europe prefer curricula that focus more on practical aspects over theoretical aspects? This article will address all these questions.

Literature Review

In this section, the authors only review the studies that are related to DL education, particularly talk about DL curriculum contents. Due to word limit and as this study is not based on a literature review, the authors reviewed the key literature on DL education. Only the studies published in English were considered for this article. The authors also did not include any discussion on library education in Europe. Readers interested in knowing more about library and information education in Europe can read studies by Virkus (2007, 2008), Audunson (2005), Juznic and Badovinac (2005), Kajberg, Horvat, and Oguz (2009), Spink and Heinström (2012), and Tammaro (2011).

Ma et al. (2009) in their article highlighted the importance of teaching DL:

> There is a clear demand for the hiring of digital librarians in digital information management, and this is a worldwide trend;

> There is increasing demand for the development of educational DLs and other types of managed digital collections such as Institutional Repositories. (p. 536)

A recent book by Myburgh and Tammaro (2013) discusses various areas in education for digital librarians including curriculum design, pedagogies, and the future role of LIS professionals.

Dahlström and Doracic (2009) examined the cultural heritage (CH) digitalization education in 12 European LIS schools in five European countries. The authors particularly focused on the CH digitalization education at Swedish School of Library and Information Science (SSLIS). They highlighted the changes associated with developing and managing CH digitization courses. In a study, Macevičiūtė, Wilson, and Francke (2009) illustrated the contents and design of international master's programs in DLs and information services at SSLIS.

Based on web analysis, one of the most cited studies on DL education, by Saracevic and Dalbello (2001), examine the 56 LIS programs in the United States and Canada. Out of the 56 LIS programs, 47 (89%) include DL in some form or another or to some degree in their curriculum; for 5 (9%) programs, this cannot be determined and 4 (7%) programs show no presence of DL education. The authors conducted a detailed examination of presented curricula, course descriptions, syllabi, and other information on the LIS programs studied.

Abrizah, Noorhidawati, Hilmi, and Azeana (2009) examined 13 LIS schools in the United States, the United Kingdom, Canada, Australia, and New Zealand offering DL courses. They found that out of the 13 LIS schools, six schools were offering an independent or a full DL course, three were offering a DL course integrated with other topics, and four were offering courses that cover processes that are closely related to DLs such as digital curation and digitization of archives. The authors also reported the DL education scenario in Malaysia.

Interdisciplinary curriculum development has received much interest and attention recently after the curriculum development project of VT-UNC Digital Library Curriculum. This was funded by the NSF through Grants NSF IIS-0535057 (to VT) and IIS-0535060 (to the UNC at Chapel Hill [UNC-CH]), and builds upon a collaboration between VT and the UNC-CH (Digital Library Curriculum Project, 2009). The VT Department of Computer Science and the UNC-CH School of Information and Library Science developed curricular materials for DL education, appropriate for the CS and LIS communities (Yang, Fox, Wildemuth, Pomerantz, & Oh, 2006).

Interdisciplinary curriculum and its related areas have been studied by a number of authors, such as Spink and Cool (1999), Coleman (2002), Pomerantz (2008), Yang et al. (2007), Yang et al. (2009), and Weech (2005). Pomerantz (2008), Yang et al. (2007), and Yang et al. (2009) being involved with the VT Department of Computer Science and the UNC-CH School of Information and Library Science DL Curriculum Development project reported the progress with the interdisciplinary curriculum development, experts opinion about curriculum contents, and different related aspects.

Using email, surveys, and website analysis of LIS schools, Spink and Cool (1999) described the state of DL research

including the state of the art in DL education worldwide. The authors highlighted the importance of interdisciplinary DL curriculum development to succeed in DL world.

Coleman (2002) reviewed studies related to education in DLs and curriculum planning from professional associations in LIS and CS. The author highlighted the importance of interdisciplinary curriculum development.

Liu (2004), like Saracevic and Dalbello (2001), carried out an Internet survey on 42 schools offering a DL course worldwide, though the majority of schools analyzed were North American LIS schools. The author highlighted the importance of practical DL courses in LIS schools. Ma et al. (2006) reported the status of DL education in the United States, the United Kingdom, and Canada. Their findings indicated a well acceptance of DL courses in different LIS schools studied. Ma et al. (2006) also highlighted the importance of designing a DL curriculum based on a combination of practical and theoretical knowledge.

Choi and Rasmussen (2006) conducted a study on DL practitioners to understand what is needed to train future LIS professionals. The findings of their study emphasize the need for technical, practical DL courses in LIS schools. Isfandyari-Moghaddam and Bayat (2008), after reviewing studies by Marion (2001), Deegan and Tanner (2001), Bawden et al. (2005), Zhou (2005), Chang and Hopkinson (2006), Choi and Rasmussen (2006), and so forth, identified 21 skills that DL professionals need to work efficiently in DL world.

Based on online questionnaires, Howard (2009) identified skills and knowledge required to work in a DL environment. She found that skills such as communication, critical thinking, and the need to be flexible were required in the DL environment. The participants of her study regarded user needs, metadata, and copyright as highly desirable knowledge areas, whereas digital repositories and legal issues were considered important issues to be covered in a DL education program by the participants of the study.

Based on the opinions of Norwegian and Thai LIS educators, Nonthacumjane (2010) identified the essential competencies for DL professionals. The author reported a number of competencies a digital librarian requires to work in the DL world. Ratzek (2009), after examining the LIS programs in Germany, in the Nordic Countries, and the United Kingdom, reported the availability of technology-based courses, including digital document handling, library software, information retrieval, and so forth, in the programs studied. He thought that LIS schools in Europe are ready to face the digital challenges.

Koltay and Boda (2008) carried out a study to explore the DL curriculum in Hungarian LIS schools. They identified the following 15 DL curriculum elements: collection development; historical studies; information retrieval and information seeking; information technology; metadata; interoperability; interface design; legal issues; electronic publishing, scholarly communication; digitization; preservation; reference services; the digital librarian; information literacy; and research.

Strengths	Weaknesses	Opportunities	Threats
Tradition in collecting cultural heritage and stimulus from i2010	More library than information, museum and archives	Bologna philosophy	Cultural differences
EU Digital Library	Energy waste in redesigning programs without clear vision	Political support for united Europe	Staff unprepared to take risks and leadership
Growing number of LIS/IS schools inside the University	Different legislative bases in our higher education	Richness in diversity of programs	Bureaucracy
Convergence with other disciplinary sector in humanities	Staff (not enough numbers and skilled)	Cooperation through projects and programs financed by the EU (mobility, recognition of qualification, design of joint, and twin curricular)	Low level of qualification required by labor market
		International transatlantic cooperation with the United States	

Note. LIS/IS = library and information science/information science.
Source. Pomerantz et. al (2009).

In a study, Tammaro (2007) offered several broad models of DL courses:

(1) technology as a tool for the building of digital libraries and the courses' focus on technological infrastructure and processes;

(2) digital libraries as environments concerned with the social and cultural contexts that digital libraries reside in;

(3) the digital library as composed of objects with the main focus on the management of the life-cycle of documents and artefacts in the digital environment; and

(4) a combined model that includes different perspectives on the subject. (p. 230)

A workshop titled "Coordinating EU-US Digital Library Education" was held in the United States at the UNC campus, in November 2008 to discuss the necessity and possibility of EU-U.S. coordination in DL education. A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was done by the workshop participants. A brief description of the SWOT analysis is given at the top of this page (Pomerantz et al., 2009).

Sadly, no further progress on the initiative was found. However, if the initiative had been successful, it would have brought significant changes and progress in LIS education in European LIS schools.

Ratzek (2009) concluded that "there is a certain danger—especially in the field of 'libraries'—that librarians become job creators for computer scientists whereas the need for librarians is shrinking at the same time (e.g., in Germany)" (p. 517). The author emphasized the importance of Information and Communication Technologies (ICTs) in LIS curriculum if future LIS professionals want to succeed in the digital revolution.

In this brief literature review, the authors reviewed studies related to DL education, competencies required to work in new digital world, recommended curriculum contents, and so on. The need for practical curriculum contents has been highlighted by the authors of various studies in DL education reviewed in this section. The authors contended that the creation of interdisciplinary curriculum particularly with CS would help LIS professionals prepare themselves for the future digital world. An ideal DL curriculum should focus much more on practical aspects. That being said, theoretical aspects of DLs as well as special focus on user behavior and user preferences should also receive priority when designing DL curriculum.

Method

Based on online surveys, this study examines the DL courses in European LIS schools, curriculum contents of DL courses, and its related areas.

Bryman (2008), one of the most prominent authors of social research methods, defines survey as

a cross-sectional design in relation to which data are collected predominantly by questionnaire or by structure interview on more than one case (usually quite a lot more than one) and at a single point in time in order to collect quantitative and qualitative data in connection with two or more variables (usually many more than two), which are then examined to detect patterns of association. (p. 46)

According to Burkell (2003), "surveys are an excellent method of collecting information about the opinions and experience of research participants. Surveys are among the most widely used methods in LIS research" (p. 239).

A questionnaire consisting of both open and closed questions was prepared for the study. Although to save the time of the respondents and to analyze the data efficiently, the majority of the questions were closed. This study obtained data that are both qualitative and quantitative in nature.

Three directories were used to identify the email addresses and websites of LIS schools in Europe:

1. European Association of Library & Information Education and Research (EUCLID) Directory (available at http://euclid-lis.eu/)
2. International Federation of Library Associations and Institutions (IFLA) World Guide to Library, Archive and Information Science Education (2007), published by K. G. Saur

3. British Association for Information and Library Education and Research (BAILER) Members Directory (available at http://www.bailer.ac.uk/membership/member-directory/; for locating LIS schools/departments in the United Kingdom).

The authors identified 159 LIS schools in Europe from these directories. The information on the LIS schools in the following countries was not found in the IFLA and EUCLID directory: Albania, Andorra, Armenia, Cyprus, Former Yugoslav Republic of Macedonia, Georgia, Liechtenstein, Luxembourg, Monaco, Montenegro, San Marino, and Vatican City State.

Out of 49 European Countries, the authors identified information on LIS schools of 37 European countries. Therefore, the LIS schools in 37 European countries were considered for this study.

It was not feasible for the authors to visit even a single LIS school from each European country due to lack of time and limited funding; therefore, online surveys were suitable for this type of study. Online questionnaires are economically beneficial as they do not require a postal charge, paper and printing of questionnaires, or resending charge. Moreover, through online surveys, it is feasible to reach a wider audience that otherwise would not be possible due to distance and other barriers. Most importantly, results of the online surveys are easy to organize, edit, present, and publish reports. This study utilized the online survey tool QuestBack (http://www.questback.com), as it was subscribed by Oslo University College, Norway (now Oslo and Akershus University College of Applied Sciences).

An online questionnaire was designed to understand the state of DL education in European LIS schools and to answer other research questions such as "What is the direction of LIS curriculum?" and "Who are the competitors of LIS schools in the DL world?" Using the facility at QuestBack, the authors prepared two questionnaires with one questionnaire consisting of 26 questions for all European countries except the United Kingdom and Ireland, and the other one consisting of 24 questions for the United Kingdom and Ireland. Two questions, that is, "Do you have a course in English? If yes, please select whether English is used for individual courses, a bachelor's level course, master's degree, PhD," were omitted for the United Kingdom and Ireland as the main language of these countries is English.

The online questionnaire used for the current study was divided into following sections:

- Demographic information
- Digital library courses in LIS schools in Europe
- Major contents of existing DL curriculum in Europe
- Major reading materials as part of DL courses
- Subject preference of the respondents as part of DL education
- Priority of DL curriculum

- Direction of LIS curriculum
- Competitors of LIS schools in the DL world
- Perceptions of digital librarianship among the respondents
- Definition of DLs by the representative of the LIS schools in Europe.

A pilot study was conducted on some International Master in Digital Library Learning (DILL) professors in three different countries and DILL students to check whether the online system was functioning properly and to obtain comments/suggestions about the questionnaire. Based on the pilot study, revision was done on the questionnaire prepared for the study.

All respondents of the current study were fully informed about the purposes and expected benefits of the study. Confidentiality was ensured in this study. No personal identifying data related to respondents, for example, email address, designation, organization, were revealed. The respondents were given the email addresses of the authors if they required any further clarification or if they had any concerns about the study.

Using QuestBack online questionnaire facility, the authors sent 159 emails on the evening of March 16, 2011. The initial deadline for the submission of the questionnaire was April 5, 2011. The study deadline was extended to April 15, 2011. Three reminder emails were sent to the heads of the 159 LIS schools in Europe.

Findings of the Study

Out of the 159 emails sent, the authors received 56 completed questionnaires. Of 56 questionnaires, two questionnaires were rejected as in one questionnaire it was clear that the respondent misunderstood the questions and the other questionnaire was incomplete (blank submission). As a result, the total response for this study is 54 (33.96%) that represents 54 LIS schools/departments in 27 European countries. The names of the universities and their corresponding countries are presented in Appendix A.

Not all questions were answered by all respondents. Therefore, the percentages were calculated on the basis of the number of respondents who answered each question.

Respondents' Background and Profiles of the LIS Schools in Europe that Participated in This Study

Most of the heads of the LIS schools in Europe answered the questionnaires by themselves. However, in a few cases, the heads of the schools forwarded the questionnaires to persons who were in charge of DL courses or who were teaching digital librarianship.

Academic positions and academic degrees of the respondents. Out of 54 LIS faculty members who participated in this

Table 1. Name of the Degrees LIS Schools Awarding.

Degrees	(n = 54)	%
Bachelor's degree	46	85
Master's degree (1 year)	16	3
Master's degree (2 years)	35	65
Joint master's degree with other institutions	9	17
Doctoral degree	32	59
Other	8	15

Note. LIS = library and information science.

Table 2. LIS Courses Offered in English.

Response	(n = 47)	%
Yes	33	70
No	14	30

Note. LIS schools in the United Kingdom and Ireland were not included in this table and the analysis. LIS = library and information science.

Table 3. Integration of Digital Librarianship in LIS Schools.

Integration of digital librarianship	(n = 54)	%
Department/school has no special focus on digital libraries	8	15
It is integrated into regular bachelor's and master's degree programs in LIS/IS	43	80
Separate degree program in digital libraries	9	17

Note. Multiple responses were allowed. LIS/IS = library and information science/information science.

study, the majority of the participants were professors (38, 70.4%). Four respondents were associate professors, five were assistant professors, and the three respondents indicated that they were lecturers. One respondent was senior lecturer, while three respondents did not indicate their academic position. The majority of the respondents, that is, 48 (89%) out of 54, had a PhD degree.

Names of the degrees LIS schools in Europe are currently awarding. It is important to know the degree awarding status of LIS schools in Europe. Therefore, one question was introduced to see the existing degrees being awarded by LIS schools in Europe. Table 1 indicates the LIS degrees being awarded by the LIS schools in Europe that participated in the study.

Courses in English. This question was asked to the representatives of the LIS schools except the LIS schools in the United Kingdom and Ireland. Therefore, out of 54 LIS schools, 49 were given the question whether they have LIS courses in English or not. Out of the 49 European LIS institutions, 47 LIS schools responded to this question.

Table 2 illustrates that the majority of the LIS schools participated in this study offer LIS courses in English in addition to the courses in their local languages. This ensures the future possibility of internationalization in LIS schools in Europe and collaboration with LIS schools in other countries.

How Is Digital Librarianship Integrated Into Educational Program?

The intention of asking the question was to identify the position of DL courses in the LIS curriculum. Do LIS schools have special focus on digital librarianship? Does digital librarianship integrated into the curriculum? Or, do LIS schools have a separate degree on digital librarianship? The answers to these questions are summarized in Table 3.

It is evident in Table 3 that the majority of the European LIS schools, that is, 43 (80%), integrated the concepts of DLs into their bachelor's and master's degrees. This indicates the positive integration of the concept of DLs into the LIS curriculum in Europe. The majority of the LIS schools

in Europe have realized the importance of having DLs in the curriculum and integrated the concept. Therefore, it is evident that LIS schools in Europe are moving toward the right direction. Moreover, 9 (17%) LIS schools were offering separate degree programs in DLs. From the data set, the authors found that one LIS school each in Croatia, Estonia, Italy, Norway, and Sweden, two LIS schools in Spain, and two LIS schools in the United Kingdom were offering separate degree programs in DLs. LIS schools in Estonia, Italy, and Norway were part of the Erasmus Mundus program named International Master in Digital Library Learning. However, out of 54 LIS schools, 8 (15%) schools had no special focus on DLs. Although the concept of DLs and its related areas are now considered as one of the core concepts of librarianship, there are LIS schools which are still unable to properly integrate the emerging concepts of digital librarianship. Research is needed to identify why LIS schools are unable to integrate emerging LIS concepts in the age of computers.

Major DL Topics and DL Education Subject Preference

Europe consists of different countries having different official languages. It would not be virtually possible for the authors to translate the course contents of LIS schools nor be possible for the respondents of the study to translate their curriculum into English for the purpose of this study. To make things easier for the respondents and to serve the purpose of the current study, respondents were asked to write three major areas/topics of DL courses present in their curriculum. Out of 54 respondents, 45 respondents wrote the major contents of the DL courses. For the purpose of understanding the major contents of the DL courses and for clarity, the authors organized the major contents of DL courses on
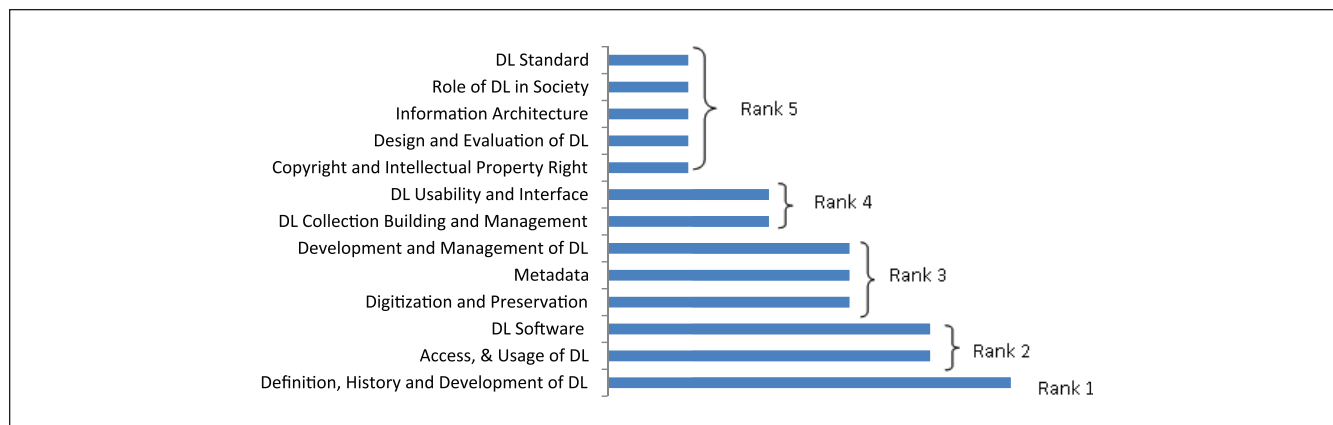
Figure 1. Thirteen topics ranked in five.
Note. DL = digital library.

the basis of the number of times they have been mentioned by the respondents. Thirteen major topics of DL courses are illustrated in Figure 1.

As evident in Figure 1, the highest ranking DL topic in the DL course curriculum in Europe is "definition, history and development of DL." It is mentioned 15 times by respondents of the current study. Second top topics of DL courses are "access and usage of DL" and "DL software." They are mentioned 14 times each. Third top position is taken by three areas "digitization and preservation," "metadata," and "development and management of DL." In terms of the number of respondents who mentioned topics, "DL collection building and management" and "DL usability and interface" received the fourth position. Copyright and intellectual property right issues are very important in DL environment. This along with other content areas, that is, "design and evaluation of DL," "information architecture," "role of DL in society," and "DL standard" are placed in the fifth position. Surprisingly, information architecture, social role of DLs, and design and evaluation are ranked so low. These are topics of strategic importance. The five top ranked areas presented in this study are also present in different sections of the DL curriculum developed by VT and the UNC-CH, USA.

A careful analysis of the DL course contents mentioned by the respondents of the current study indicates that there is no single topic that everyone mentioned. This is an indication of diverse areas taught as part of DL courses in European LIS schools. Research is needed to examine the curriculum contents of DL courses offered at different LIS schools in Europe in much more detail and to see whether LIS curricula in particular DL-related curricula are diverse or there are some areas where the majority of LIS schools have similar concentrations.

The respondents of the current study were given 24 subjects areas and asked to rate the importance of these subject areas based on their importance in DL education/courses. Table 4 presents the DL education/courses areas ranked on the basis of their importance as indicated by the respondents. The list of these 24 areas was developed on the basis the curriculum of DILL, Digital Library Curriculum Project of VT and the UNC-CH, DL curriculum of LIS schools in North America, and in consultation with professors at DILL.

As evident in Table 4, out of 54 respondents 53 respondents rated most of the subjects mentioned in the table. However, the subject Internet Studies was rated by 49 respondents. Some subjects were rated by 52 respondents. Four subject areas "digital library architecture and design," "information retrieval," "digital archiving," and "electronic collection and resources development" were considered extremely important and very important by the respondents of the current study in terms of their importance to DL education. Although the topic architecture and design (see Figure 1) was ranked low in major contents of DL education in Europe, in terms of its importance, it is one of the top important subject areas for DL curriculum. LIS educators and curriculum developers can keep in mind the top ranked 10 subject areas indicated by the respondents of the study when designing separate DL program or developing DL courses in their departments/schools.

Core Reading in DL Education in Europe

The respondents of the current study were asked to write the names of two books and three journals in DLs they would recommend. The intention was to investigate the core books and journals in DLs in Europe. The answers to these questions are presented as follows.

Books. Out of 54 respondents, 33 respondents wrote the names of books in DLs they would recommend. There is a tendency among participants of any study to avoid open-ended questions due to several factors including time required to answer open-ended questions. As indicated in Table 5, national textbooks on DLs were mentioned by 10 respondents

Table 4. Digital Library Education Subject Areas Ranked on the Basis of Their Importance.

Serial No.	Name of the subject	Percentage regarding a topic as very important + extremely important	Total respondents	Rank
1.	Digital library architecture and design	83	(n = 52)	1
2.	Information retrieval	83	(n = 52)	1
3.	Digital archiving	81	(n = 53)	2
4.	Electronic collection and resources development	81	(n = 53)	2
5.	Copyright and Intellectual property right	79	(n = 53)	3
6.	Digitization	79	(n = 53)	3
7.	Information seeking behavior	77	(n = 53)	4
8.	Mediation of content from the digital libraries to users	73	(n = 52)	5
9.	User studies	72	(n = 53)	6
10.	Metadata studies	70	(n = 53)	7
11.	Database management system	66	(n = 53)	8
12.	Automated indexing and abstracting	58	(n = 53)	9
13.	Information and knowledge management	58	(n = 53)	9
14.	Cataloging and classification	56	(n = 52)	10
15.	Basic hardware and software course	55	(n = 53)	11
16.	Learning about digital library software, for example, DSpace, Greenstone, Fedora, etc.	54	(n = 52)	12
17.	Research methodologies in LIS	51	(n = 53)	13
18.	Internet studies	51	(n = 49)	13
19.	Reference services	48	(n = 52)	14
20.	Marketing of information products and services	43	(n = 53)	15
21.	Library and information society	38	(n = 53)	16
22.	Social and political role of information and libraries	38	(n = 53)	16
23.	Information and cultural studies	28	(n = 53)	17
24.	Human resources management	19	(n = 53)	18

Note. LIS = library and information science.

Table 5. Recommended Books in DL Education by European LIS Faculty Members.

Title of the book	Author(s)/editor(s)	Frequency (n = 33)	Rank
National textbooks on digital libraries and related aspects[a]		10	1
Digital Libraries	William Y. Arms	6	2
From Gutenberg to the Global	Christine L.	5	3
Information Infrastructure: Access to	Borgman		
Information in the Networked World Understanding Digital Libraries	Michael Lesk	5	3
Digital Libraries: Principles and Practice in a Global Environment	Lucy A. Tedd and Andrew Large	5	3
Introduction to Digital Libraries	Chowdhury, G. G. and Chowdhury, S	4	4
Digital libraries: Integrating Content and Systems	Mark Dahl, Kyle Banerjee and Michael Spalti	4	4
How to Build a Digital Library	Ian H. Witten and David Bainbridge	3	5

Note. DL = digital library; LIS = library and information science.
[a]Recommended by respondents from Bulgaria, Croatia, Germany, Hungary, Portugal, Poland, and Russia.

of the study. The national textbooks on DLs were mentioned by respondents from Bulgaria, Croatia, Germany, Hungary, Portugal, Poland, and Russia. This is reasonable as Europe consists of several countries with different languages than English. Not all LIS schools will follow English books. Rather for greater understanding of emerging academic areas, some students would prefer to read books in their native languages. The result on recommended books on DLs also indicates the importance of local DL books in some European countries. As we know, publishers usually publish books in subject areas that are in high demands and are profitable. The authors do not know whether the books were published by local publishers or by authors but the authors assume that high demands for the books in DLs resulted in local book publication. The results in this section also indicate the fast growing reliability and dependency on national textbooks.

As evident in Table 5, the national textbooks recommended by respondents from Bulgaria, Croatia, Germany, Hungary, Portugal, Poland, and Russia are in top position among the books recommended by other respondents. This indicates a growing reliability and dependency on the national textbooks published in different countries and in different languages. This also indicates the importance of the DL aspects at the national level. It is logical to think that the books written in national languages might be based on the popular international books on DLs. This study clearly indicates the fact that there are good numbers of books on DLs published in different languages and in different European countries.

The authors listed the recommended local books in DLs under National Textbooks and listed all English books individually on the basis of the number of times they were mentioned by the respondents. Table 5 illustrates the list of eight books ranked in fifth position as recommended books in DL education with their numbers of occurrences. Other books recommended by the LIS faculty members of European LIS schools are presented in Appendix B.

While analyzing the data on textbooks on DL education, Liu (2004) found that a book written by Lesk (1997) titled *Practical Digital Libraries: Books, Bytes and Bucks* was the most popular and found in the syllabi of seven schools. A book by Borgman (2000) titled *From Gutenberg to the Global Information Structure: Access to Information in the Networked world* and Arms's (2000) *Digital Libraries* are second and third, respectively, most popular in courses on DL. William Y. Arms's book titled *Digital Libraries* was recommended by the second highest number of respondents of the current study, which was in third position in Liu's findings. It is clear that Borgman's book titled *From Gutenberg to the Global Information Structure: Access to Information in the Networked World* took second position in Liu's study and third position in the current study.

A similar study was conducted by Pomerantz et al. in 2006. In their article, they listed the five most frequently assigned books in DL courses. These were as follows:

- Witten, I. H., & Bainbridge, D. (2003). *How to build a digital library*. San Francisco, CA: Morgan Kaufman.
- Arms, W. Y. (2000). *Digital libraries*. Cambridge, MA: The MIT Press.
- Borgman, C. L. (2000). *From Gutenberg to the global information infrastructure*. Cambridge, MA: The MIT Press.
- Lesk, M. (2004). *Understanding digital libraries* (2nd ed.). San Francisco, CA: Morgan Kaufman.
- Chowdhury, G. G., & Chowdhury, S. (2003). *Introduction to digital libraries*. London, England: Facet.

All these books were also mentioned by the respondents of the current study as recommended books on digital librarianship and placed in among the five top recommended books. Therefore, it can be said that faculty members of European LIS schools are aware of popular books in DL. However, the answer to the question whether there are any books on DLs that might be considered as core books and recommended by the majority of the respondents of the current study is "No." There was no book on DLs that was recommended by the majority of the respondents. But there were some international books that were popular and recommended by a number of respondents.

One of the very prominent faculty members in the field of digital librarianship and head of a LIS school in Europe thinks that scholarly discourse of DLs is in journal articles. In his words, "There are really no books on digital libraries that I recommend. The scholarly discourse is entirely in journal articles. Bill Arms old book on digital libraries is still useful, though."

Another respondent also wrote about suggesting students to analyze journal articles instead of books. Another respondent wrote, "No particular recommendation, would direct students to current listings like Facet Publishing (London), Ashgate, Chandos." These are undoubtedly good approaches of directing students to the current listing and journals. As a result, students would be able to know the current trends, publication in the field of their study, and be updated always with the development in their field of studies.

Journals. Thirty-five respondents wrote the names of the journals in DLs they would recommend. The result was quite interesting. They wrote the names of several journals they consider worthy for studies on DLs. Table 6 shows the list of journals recommended by the European faculty members for DL course.

As evident in Table 6, *D-Lib Magazine* was mentioned by the highest numbers of respondents. *D-Lib Magazine* is an electronic publication with a focus on DL research and development, including new technologies, applications, and contextual social and economic issues. After *D-Lib*, the second position was taken by national journals recommended by respondents from Croatia, Czech Republic, Hungary, Italy, Poland, and Spain. Like national textbooks, this again indicates the availability of local journals that cover DL aspects as well as the reliability and dependency of the European faculty members on the national journals published in their native languages. *Library Hi Tech* was in third position. Fourth position was taken by *International Journal on Digital Libraries*. Fifth position was taken by journal *The Electronic Library. Journal of the American Society for Information Science and Technology* (*JASIST*; now *Journal of the Association for Information Science and Technology*) and *Ariadne* jointly took the sixth position. *Journal of Documentation* (*JDoc*) was in seventh position. *New Library and Information Processing & Management* are jointly in eighth position. Other nine journals are in ninth position.

Table 6. Recommended Journals for DL Education.

| S. no.	Name	Value
1.	*D-Lib Magazine*	21
2.	National Journals (recommended by respondents from Croatia, Czech Republic, Hungary, Italy, Poland, Spain)	12
3.	*Library Hi Tech*	07
4.	*International Journal on Digital Libraries*	06
5.	*The Electronic Library*	05
6.	*Journal of the American Society for Information Science and Technology* (now *Journal of the Association for Information Science and Technology*)	04
7.	*Ariadne*	04
8.	*Journal of Documentation*	03
9.	*New Library World*	02
10.	*Information Processing & Management*	02
11.	*Annual Review of Information Science and Technology*	01
12.	*Journal of Librarianship and Information Science*	01
13.	*Communications of the ACM*	01
14.	*Journal of Information Science*	01
15.	*Digital Humanities Quarterly*	01
16.	*Webology*	01
17.	*Program: Electronic Library and Information Systems*	01
18.	*First Monday*	01
19.	*Journal of Digital Information*	01

Note. DL = digital library.

Interestingly, the top five journals are journals with a low impact. In the Norwegian and Danish incentive system for scientific publishing, journals are grouped in two categories, 1 and 2. Category 1 consists of low-impact journals, whereas Category 2 consists of the most prestigious journals. Not more than 20% of the journals in a given field (e.g., LIS) can be in Category 2. In LIS, journals such as *JASIST, Information Processing & Management*, and *JDoc* are in Category 2; they are all below top 5 in our ranking. The top 5 are all in Category 1.

Pomerantz et al. (2006) analyzing the curriculum of DL course identified 121 journals. Out of that, they listed top 13 most frequently assigned journals in DL courses. Among the 13 journals listed by Pomerantz et al. (2006), respondents of current study recommended eight journals. *D-Lib Magazine* is in the top position for both the current study and the study conducted by Pomerantz et al. (2006).

According to Bearman (2007),

the core journals on digital libraries include College & Research Libraries, Communications of the ACM, Electronic Library, Information Processing and Management, Information Technology and Libraries, the Journal of the American Society for Information Science and Technology, Library Trends, and Online Information Review. Bearman thinks that the International Journal on Digital Libraries has served as a venue for important articles from time to time. (p. 225, para. 2)
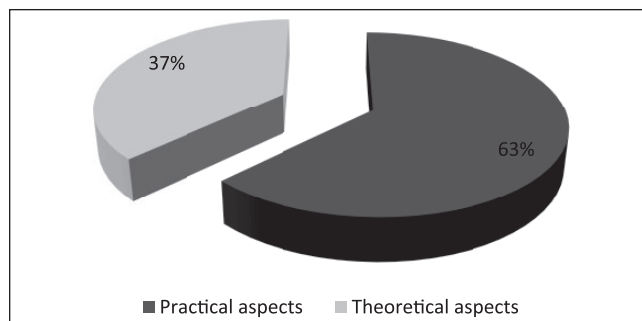
Figure 2. Practical aspects versus theoretical aspects.

The respondents of the current study recommended five out of nine core journals mentioned by Bearman.

One observation that is evident in the current study is that there was no single journal on digital librarianship that was recommended by a majority of the European LIS faculty members. Except for *D-Lib*, most of the journals were recommended by few respondents. However, there was also a clear indication of the increasing dependency on national journals on digital librarianship.

Practical Aspects Versus Theoretical Aspects

While designing a DL curriculum, we can choose between giving priority to practical aspects or to theoretical aspects. Usually, DL courses conducted by CS and engineering faculty are composed of more practical aspects than theoretical aspects. It is evident in the Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE) Computing Curricula 2001 that there is one elective course on DL that mainly focuses on the practical aspects of DLs. DL courses offered by LIS schools tend to concentrate more on theoretical aspects than practical. It is important to see the preferences of European LIS faculty members regarding DL course curricula. Do they prefer more practical aspects or do they prefer theoretical aspects? Their preferences are illustrated in Figure 2.

As shown in Figure 2, the question on practical aspects or theoretical aspects was answered by 51 respondents out of 54. If the faculty members were given the option to choose only one aspect either practical or theoretical, 32 (63%) respondents would choose practical aspects, whereas 19 (37%) respondents would choose theoretical aspects. This result indicates the importance of practical aspects in DL courses and gives us direction for developing DL curricula. Liu (2004) concluded,

as the whole area of digital libraries is presently growing at a fantastic rate, those students who have received practical experience with digital libraries, such as those provided in the "hands-on" courses, appear to be the best served for future practice in the field of librarianship. (p. 67)
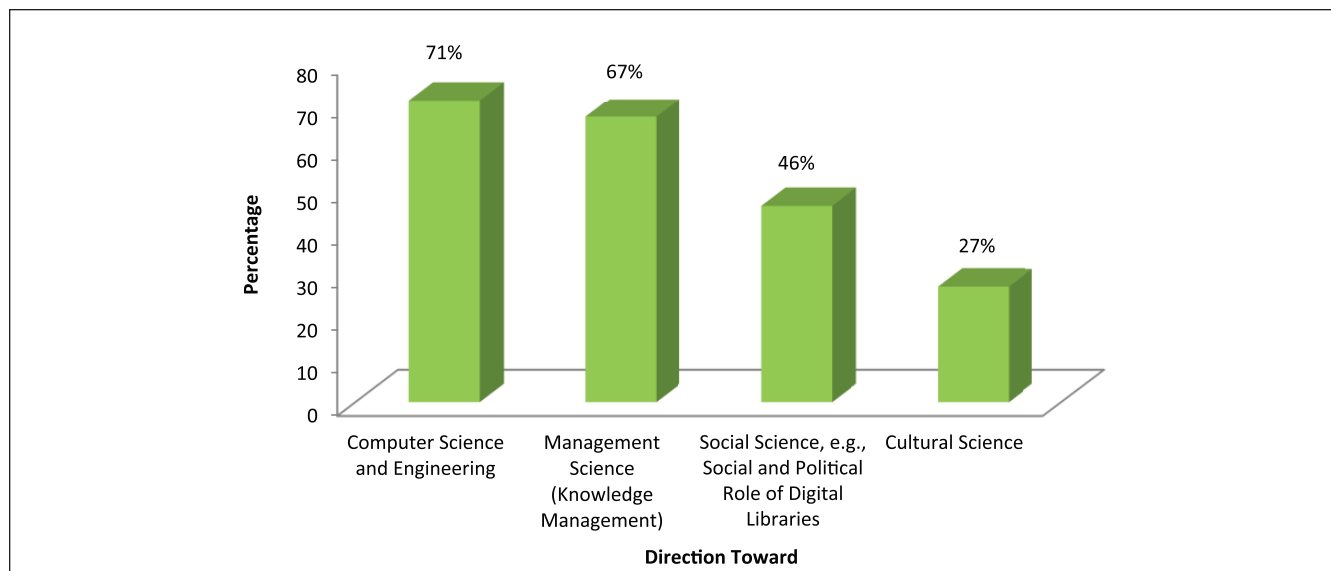
Figure 3. Direction of LIS curriculum.
Note. Multiple responses allowed. LIS = library and information science.

As reported by Ma et al. (2006), many attendees of Joint Conference on Digital Libraries (JCDL '05) workshop on DL education were strongly in favor of integrating hands-on training in working DLs as part of the curriculum, although others proposed a hybrid curriculum to bring together strengths from diverse departments. The preference of practical aspects in DL curriculum by the faculty members of the LIS schools who participated in this study is noticeable in the DL education subject area preferences (see Table 4).

Direction of LIS Curriculum

It is evident in the recent curriculum of LIS that it comprises a number of subject areas that originated from CS, media and communication, management, and so forth. After the emergence of web technologies and new model of information management and services and evolution of DLs, LIS curricula integrated a great deal of subject contents from CS. Recent influence of various subjects on LIS curriculum is evident in the curricula of LIS schools around the globe.

It is time to think the future directions of LIS curricula. Are we moving toward CS, management science, social science, or cultural science? Influences of other disciplines on LIS curricula are obvious. A question was asked to acquire the opinion of the European LIS faculty members about the future direction of LIS curriculum in this study. Out of 54 respondents, 52 respondents indicated their opinion.

Figure 3 illustrates the future direction of LIS curricula according to the opinion of faculty members of the LIS schools in Europe who participated in this study.

As shown in Figure 3, 37 (71%) respondents out of 52 were of the opinion that LIS curricula are moving toward CS. This means that the majority of the LIS faculty members agree with the fact that DL is drawing LIS/information science (LIS/IS)

curricula in the direction of CS and engineering. If we examine the current LIS curricula in different LIS schools around the world, we will surely find that LIS schools have already integrated several courses that originated from CS. Out of 52 respondents, 35 (67%) respondents thought that the direction of LIS curricula is management science. Knowledge management and other aspects of management related to library and information centers are already present in LIS curricula of different LIS schools. Twenty-four respondents (46%) were of the opinion that DL is drawing LIS/IS curriculum in the direction of social science and only 14 (27%) respondents were of the opinion that DL is drawing LIS/IS curriculum in the direction of cultural science.

The result of the direction of LIS curricula indicates two obvious future directions of LIS curricula. Future LIS curricula will reasonably be directed toward CS and engineering as well as management science. Presumably, LIS curricula will be influenced by many subject areas in future, some of which may have not emerged yet. Robot technology, space science, and satellite technology may have future influence on LIS curriculum. In future, the LIS discipline will focus more on technology than any other thing. Libraries and LIS discipline will never disappear. Instead, the LIS discipline will marry many subject areas to ensure its presence in the future information world. LIS discipline will be shaped and reshaped according to the demands of the world.

Digital Librarianship

One question was introduced to see how European LIS faculty members considered digital librarianship. Is digital librarianship the librarianship in the digital age or is it a separate emerging discipline distinct from librarianship or is it a mixture of both? The answers to the question are presented in Table 7.

Table 7. Digital Librarianship.

Digital librarianship is	Frequency (*n* = 54)	%
1. Librarianship in the digital age	18	33
2. Separate emerging discipline distinct from librarianship	2	4
3. Mixture of both 1 and 2	34	63

Table 8. Competitors of LIS Schools in the DL World.

Name of the schools	Very strong + strong competitor	%
CSE schools	42	78 (*n* = 54)
Management science and business schools	29	55 (*n* = 53)
Communications and media schools	40	70 (*n* = 53)

Note. Multiple responses were allowed. LIS = library and information science; DL = digital library; CSE = computer science and engineering.

The majority of the European LIS faculty members, that is, 34 (63%) participants in this study, considered "digital librarianship" as a mixture of librarianship in the digital age and a separate emerging discipline. Out of 54 respondents, 18 (33%) respondents considered it "Librarianship in the Digital Age" and two (4%) respondents considered it as a separate emerging discipline distinct from librarianship.

LIS professionals, researchers, and library thinkers are not in a position to argue that DLs and digital librarianship are completely librarianship in the digital age and the sole product of the library field, nor can they say that they are a completely separate discipline, distinct from librarianship. In one sense, digital librarianship is librarianship in the digital age, and in another sense, digital librarianship is a separate emerging discipline developing with the support of mainly CS people. DL curricula in LIS schools on one hand include digital ethics, user behaviors, digital literacy, freedom of information as well as other areas derived from traditional librarianship. On the other hand, DL curricula include database management, software programming, web design, and other areas derived from CS. Therefore, digital librarianship is a mixture of both librarianship and separate emerging discipline.

Competitors of LIS Schools in DL World

Yang, Wildemuth, Pomerantz, Oh, and Fox (2009) noted that several disciplines have an interest in the development of a graduate-level curriculum for DL education. Most DL courses have been taught either in LIS or CS programs (Ma et al., 2009). A question was asked to the European LIS faculty to identify the competitors of LIS schools in the case of DL course offering. In this question, three kinds of schools were specified as potential competitors of LIS schools in the DL world. These were "computer science and engineering

(CSE) schools," "management science and business schools," and "communications and media schools." The respondents were given five options to select from, namely, (a) very strong competitor, (b) strong competitor, (c) competitor, (d) not strong competitor, and (e) not competitor at all.

The authors combined the very strong competitor, strong competitor, and competitor ratings of the respondents to identify the true competitors of LIS schools in DL world. Table 8 presents competitors of LIS schools in the DL world.

Table 8 shows that the majority of LIS faculty members, that is, 42 (78%), considered CSE schools as the greatest competitors of LIS schools in DL world, while second highest numbers of respondents, that is, 40 (70%), considered communications and media schools as competitors of the LIS schools in DL world. Out of 53 respondents, 29 (55%) respondents considered management science and business schools as competitors of LIS schools in the DL world.

Ratzek (2009) thought that "there is a certain danger-especially in the field of 'libraries' that librarians become job creators for computer scientist whereas the need for librarian is shrinking at the same time (e.g., in Germany)" (p. 517).

Will the competitors of LIS schools grab the LIS discipline? Will LIS discipline become unnecessary for the future information world? What should we do to secure our discipline for the future competitive academic world? LIS faculty members should keep these questions in mind and should design the LIS curriculum in a way that meets the requirements of the new market and include the necessary knowledge and skills to be very competent in the future information world.

Future Research Directions

A separate study to explore the DL curriculum/courses in the CS schools of European countries may be conducted using the methodologies and questionnaire used for the current study. Comparative studies of trends and state of the art in DL education in the Eastern Europe, Western Europe, Northern Europe, and Southern Europe might also be conducted following the same methodologies applied to this study.

A study to assess the European DL practitioners' preferences about DL course contents is a very important research area that should be considered by the researchers in DL arena to know the skills and knowledge required in the DL world. An in-depth focus group study with the DL researchers and faculty members is also feasible to find out their perceptions, choice, and other related issues in relation to DL. Studies on DL education–related aspects in other regions and countries in the world may follow the methodologies and research problems and related things like the current study in conducting a similar type of study. For example, a similar type of study to explore the state of the art in DL education in South Asian, Arabian, or African countries may easily be conducted using the methodologies used for the current study with necessary modifications.

A separate study to explore the DL curriculum in the CSE schools of European countries may be conducted using the methodologies and questionnaire used for the current study.

A separate comprehensive study that focuses on the DL curriculum contents of the LIS schools is worth conducting. A comparative study of trends and state of the art in DL education in Eastern Europe, Western Europe, Northern Europe, and Southern Europe might also be conducted following the same methodologies applied to this study.

A collaborative study is warranted in European context. Researchers from different European countries can conduct studies to examine LIS education, particularly DL education in various European countries. For example, researchers from Baltic countries can collaborate with researchers from Nordic countries to report the LIS education in Baltic and Nordic countries. A separate study can also be conducted to explore the perceptions of LIS education among the LIS faculty members in European countries. What is the future of LIS education? What is the direction of LIS education in Europe? What are the important subject areas LIS schools should integrate into their curricula? What should be done to secure the position of LIS in the future information world?

A web content analysis of LIS courses, programs, and research concentrations can be done to assess the status of LIS schools in Europe and their research areas. What are the key courses that LIS schools in Europe are offering? Are there any core courses that are offered by the LIS schools in Europe? What are the research concentrations of LIS schools in Europe? Are LIS schools in Europe different in terms of research concentration? Is there any regional or local influence on research concentration? For example, Nordic countries may have special concentration or interest in conducting research about them or in areas that benefit them.

A separate study, utilizing qualitative interview techniques, can be conducted to obtain the perceptions of LIS education in Europe among the prominent LIS scholars, academics, and leaders of professional associations in Europe. What is the status of LIS education in Europe? What should be done to increase internationalization of LIS education in Europe? What should be done to develop joint LIS programs? What is the future of LIS education in Europe? What should be done to improve the status of LIS education in Europe and to produce future qualified information professionals? What role can LIS associations play to increase the collaboration and cooperation among LIS schools and to develop a standardized LIS curriculum across Europe?

A study can be conducted to explore the outcome of DILL or other DL courses offered at various European LIS schools. What are the job status/positions of students of DILL course? Are they working in the DL sector? Does DILL help them getting a decent job? Do they face any problem working in the DL world? Does the curriculum of DILL match with the practical needs of DLs? Do they have any recommendation for future improvement of the course?

A study to explore the internationalization of LIS education in Europe would be worth taking. What is the current state of internationalization at various LIS schools in Europe? Do they offer English courses at different program levels? Do they have English websites? Do they have English version of their curricula? How many international students do they admit each year? Do they have any collaborative master's or doctoral programs with European LIS schools and with international LIS schools? What is the current faculty strength of LIS schools in Europe? How many of them have PhD from foreign countries? How many of them are experts in emerging LIS areas including DLs, digital humanities, and so on? How many of them can teach in English? This study can be conducted with the help of the heads/directors of the LIS schools in Europe. A questionnaire can be prepared and sent to the representatives of LIS schools in Europe for their input.

Conclusion

This study has attempted to fill some gaps in research on DL education and related areas in Europe. The study reports the existing curriculum contents of surveyed European LIS schools and the preferences of DL curriculum among the faculty members who participated in this study. It is found that the majority of the LIS schools in Europe that participated in this study have already integrated the DL concepts in their curricula. Moreover, nearly 20% of LIS schools indicated that they have separate DL degree program. The DL course contents of the LIS schools in Europe are diverse and the importance of practical DL course contents has been highlighted by the participants of the study.

The study also reports the growth of national textbooks on DLs and the importance of national level journals for DL courses in a number of LIS schools in Europe. Although a number of English textbooks and journals were recommended by a number of faculty members for DL courses, the study did not find any core DL textbooks and journals for DL courses.

Based on the results, the study finds a number of directions for the LIS curricula. Two obvious directions for LIS curricula would be moving toward CS and engineering as well as management. Moreover, nearly 50% of European faculty members who participated in this study think that LIS curricula are moving toward social science. The study asserts that in future, LIS curricula will take different directions to meet the demands of the time and the profession. Presumably, modern technologies will have high influence on LIS curricula. The need for collaboration among different discipline has also been highlighted in this study. Based on the results obtained, the authors contend that the future LIS education will consist of more of collaborative programs with several disciplines including CS, management, culture science, and so on. The study also emphasizes the need for Europe-wide DL/LIS curriculum.

The authors expect that the results obtained as part of this study will be of interest to DL researchers, educationalists, and policy makers in European countries as well as around the world. The authors also expect that the study will contribute to the discussions and debates toward identifying subject elements for DL courses. The top subject areas (see Table 4) based on their importance as reported by the participants of the current study should be taken into consideration before designing curricula for DLs and before developing a Europe-wide unique LIS curriculum.

Appendix A

List of Universities That Participated in This Study.

Country	No.	Name of the university
Austria	1	University of Graz
Bosnia and Herzegovina	1	University of Sarajevo
Bulgaria	1	St. Kliment Ohridski University of Sofia
Croatia	3	University of Zagreb
		University of Osijek
		University of Zadar
Czech Republic	1	Silesian University in Opava
Estonia	1	Tallinn University
Finland	2	Åbo Akademi
		University of Tampere
Germany	5	HAW Hamburg
		Fachhochschule Hannover
		Johannes Gutenberg University Mainz (D)
		Humboldt-Universität zu Berlin
		Hochschule Darmstadt
Greece	2	Ionian University
		Technological Education Institute of Thessaloniki
Hungary	3	Kaposvár University
		Szeged University
		University of Szeged
Iceland	1	Iceland University
Italy	1	University of Parma
Latvia	1	University of Latvia
Malta	1	University of Malta
Moldova	1	Moldova State University
Netherlands	4	University of Urbino
		Saxion University of Applied Sciences
		Hogeschool van Amsterdam, University of Applied Sciences
		Hanze University
Norway	2	Oslo University College
		University of Tromsø
Poland	4	Jagioellonian University, Kraków
		University Maria Curie Sklodowska, Lublin
		UMK (Nicolaus Copernicus University)
		Adam Mickiewicz University
Portugal	1	University of Porto
Russia	1	Chelyabinsk State Academy of Culture and Arts
Serbia	1	University of Belgrade
Slovakia	1	Comenius University
Slovenia	1	University of Ljubljana
Spain	4	University of León
		University of Barcelona
		University Carlos III of Madrid
		Universidade da Coruña
Sweden	3	Linnaeus University
		Uppsala University
		University of Borås
Turkey	2	Hacettepe University
		Istanbul University
United Kingdom	5	City University London
		Robert Gordon University, Aberdeen
		University of Brighton
		University of West London (former Thames Valley University)
		University of Sheffield
Total	54	

Appendix B

Other Recommended Books in DL Education.

Title of the book	Author/editor	(*n* = 33)
Building Digital Libraries: A How-to-Do-It Manual	Terry Reese and Kyle Banerjee	02
Scholarship in the Digital Age:	Christine L.	02
Information, Infrastructure and the Internet	Borgman	
DL Economics	David Baker and Wendy Evans	01
DL Futures	Verheul, de Gruyter	01
Preserving Digital Information	Henry Gladney	01
The Library in the 21st Century	Peter Brophy	01
Information Society	Robert Hassan	01
E-books in Libraries: A Practical Guide	Kate Price and Virginia Havergal (Editors)	01
M-libraries	Mohamed Ally and Gill Needham (Editors)	01
University Libraries and Digital	Penny Dale and Jill	01
Learning Environments	Beard (Editors)	
Use and Users of Electronic Library Resources: An Overview and Analysis of Recent Research Studies	Carol Tenopir	01
Scholarly Publishing: Books, Journals, Publishers, and Libraries in the Twentieth Century	Katina Strauch	01
Semantic Digital Libraries	Sebastian Ryszard Kruk and Bill McDaniel (Editors)	01
Digital Agenda for Europe: Digital Libraries Initiative	http://ec.europa.eu/information_society/activities/digital_libraries	01
Digital Libraries: Policy, Planning and Practice	Judith Andrews (Editor)	01
DL Development	Marcum and George	01
Business Planning for Digital Libraries	Mel Collier (Editor)	01
Tagging: People-Powered Metadata for the Social Web	Gene Smith	01
The Handbook of Internet Studies	Mia Consalvo and Charles Ess (Editors)	01
Digital Libraries: High School Textbook	Shraiberg Yakov	01

Note. DL = digital library.

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