

Digital library education in Iran: Perspectives of Library & Information Science educators and academic librarians

Behrooz Rasuli¹ and Nader Naghshineh²

¹Department of Library and Information Science,
Iranian Research Institute for Information Science and Technology
No 1090, Enghelab Ave., Felestin St., P. O. Box: 13185-1371, Tehran, IRAN

²Faculty of Library and Information Science, University of Tehran
Faculty of Library and Information Science, University of Tehran,
Enghelab Ave., 16 Azar St, Tehran, IRAN

e-mail : rasouli@students.irandoc.ac.ir (corresponding author);
nnaghsh@ut.ac.ir

ABSTRACT

This study explores Iranian Library and Information Science (LIS) educators' and academic librarians' viewpoints about a dedicated digital library education programme, as well as solicits proposed models and courses on digital libraries. A survey was administered on a sample of 45 LIS educators and 66 academic librarians via an online questionnaire. Responses were analyzed by descriptive statistics (for closed questions) and content analysis (for open-ended questions). Results show that the current LIS education curriculum in Iran does not sufficiently teach LIS students and librarians digital library principles and concepts; in addition, a high majority of LIS educators and academic librarians are in favour of a dedicated digital library education programme. This study provides the empirical data for the design and delivery of a dedicated programme or relevant courses on digital libraries at Iranian library schools, especially at the newly established LIS departments in Iran. Digital library management, digital preservation, digitization, digital library architecture, and metadata would be the key components in a digital library education programme. Research on digital library education has not been carried out before in Iran. As such, this paper may fill the research gap between theory and practice of Iranian digital librarianship, as well as facilitates LIS departments to design digital library programme and implement the courses in their curriculum.

Keywords: Digital libraries; Digital library education; Library and Information Science curriculum; Iran.

INTRODUCTION

Libraries have been functioning to preserve, organize, and disseminate information and knowledge, and the importance of these institutions increased with the invention of printing and the increase of publications. The famous German librarian, Walter Schuermeyer (at the 13th Documentation Conference, Copenhagen, 1935) once stated that: "Perhaps one day we will see our reading rooms deserted and in their place a room

without people in which books requested by telephone are displayed, which the users read in their homes using television" (Buckland 1992, p. 27). In the 1960s, some futurists (such as Lickliger) in their writings pointed to libraries that would be very modern due to the technological changes, and they would be accessed and used differently in the future (Saracevic and Dalbello 2001). With the amazing development of the Web, libraries are faced with a challenge. The Web is an information channel that is larger and more accessible than libraries; therefore, its popularity is increasing day by day. What is more, digital libraries have found their place on the Web. With the potential to systematize knowledge, digital libraries have separated themselves from other web resources. Although different societies produce vast amount of information daily, and the need for quality organized information is inevitable, digital libraries seem to be able to address this need perfectly (Yang et al. 2006; 2009). The number of digital libraries being developed and implemented is strongly growing (Wang 2003). As a result, research on digital libraries have increased dramatically since 2000 and numerous resources on this subject have been published in the forms of technical reports, proceedings and journal articles, as well as books (Koulouris and Kapidakis 2012).

Traditional librarians have been dealing with print resources – far removed from the demands of the digital library environment. Much of the traditional librarians jobs have been reduced and librarians today need a combination of skills and capabilities to work in the digital and networked environment. As Myburgh (2003) remarks, the time has come for librarians to change the printed document management approach to information management. One of the principles of digital library development is acceptance of change and librarians must accept that the paradigm has changed (McCray and Gallagher 2001). Professional librarians are crucial elements in the successful development of digital libraries. Paying attention to the governing approach in association with human resource management in traditional libraries, Isfandiari-Moghadam and Bayat (2007) wrote that such an approach in digital libraries seems to be necessary because the dynamic, changing, competitive environment has multiplied, considering specialized staff and managing their skills and competences.

As a result of the changing nature of library and information services and the increase in digital information, the education of digital library has become imperative to the Library and Information Science (LIS) curriculum. Developing a digital library curriculum is the first important step in educating digital librarians to work in a digital library environment (Choi and Rasmussen 2006). Library schools worldwide need more prominence on an interdisciplinary educational approach in order to equip LIS students with the necessary skills to work in the current digital environment. As such digital library education should be considered as an important issue in the interdisciplinary education of LIS (Coleman 2002).

An analysis of the LIS curriculum in Iran reveals that there has been no dedicated or stand-alone digital library programme or even a course (or subject) on digital library. None of digital library research or digital library-related studies in Iran have addressed the need for digital library education or knowledge and skills on digital libraries. The first LIS department in Iran was established in 1966 (Mortezaie and Naghshineh 2002). LIS education programmes are under the jurisdiction of two ministries in Iran, namely the Ministry of Science, Research and Technology (MSRT) and the Ministry of Health and Medical Education (MHME). MSRT offers LIS education at the undergraduate, masters and doctoral level, whereas MHME offers medical librarianship programme at the bachelor and masters degree level. There have been important changes in the LIS field as the name of the discipline was changed in the second half of 2012, from *Library and Information Science* to

Knowledge and Information Science (Ministry of Science, Research and Technology [of Iran] 2012).

An analysis of Iranian LIS curriculum found to be severally lacking inflexibility (Mortezaei 2001; Fattahi 2005; Fattahi 2006; Norouzi 2008) compared with LIS curriculum development in other countries. There have been many national studies that emphasized on revising the current LIS curriculum, incorporating new skills and knowledge associated with digital librarianship (Tahouri 2006; Fattahi 2005; Jowkar and Hamdipour 2001; Haidari 2011; Hayati 2004; Mehrad 2008; Mansouri and Pashoutanizadeh 2007; Dayani 2000; Hasanzadeh and Ghauri 2010). Fattahi (2005) and Fadaei (2009), in their proposed curriculum to MSRT, incorporated an independent course in digital libraries. Mohsenzadeh and Isfandyari-Moghaddam (2011) underlined that the lack of technological infrastructure and trained personnel led to issues in digital library development in Iran and they believed that founding a digital library education programme would have the potential to eradicate the issues. While librarians are aware of the need for such programmes to improve digital library experience, the requirement for digital library education has not been established. There is a need to know the extent of the current LIS curriculum in preparing librarians to work in a digital library environment, the curriculum required for a dedicated digital library programme, as well as the competencies and knowledge deemed necessary to work in a digital library environment in Iran. Therefore this study seeks to identify and examine the current courses or programmes in digital library education, and consider how best to educate and train digital librarians in Iran. The perspectives of LIS educators and academic librarians are solicited in terms of their familiarity with digital library curriculum content and course offerings.

LITERATURE REVIEW

Digital library education started more than a decade ago in many parts of the world, especially in the USA and Europe. As early as 1999, Spink and Cool (1999) estimated the total number of digital library courses to be approximately twenty. In 2004, Liu (2004) reported that 42 schools offered digital library-related course, and most of these courses are offered at the Masters and PhD levels in the USA and Europe. This number reached 60 in 2005 (Bawden, Vilar and Zabukovec 2005); and finally, Clegg, Ma, and O'Brien (2006) found 47 institutions offering programmes or courses in digital library education in the USA alone (32 courses in LIS, and 15 courses in Computer Science). Weech (2005) reported that the number of courses on digital libraries taught in LIS schools in the USA has more than doubled in the past four years. He noted that due to the growth of the digital library community, there is a need for restructuring LIS education programs to support the need for digital librarians. Weech also studied the curricular trends for digital librarianship and analyzed the skills seen as desirable for librarians to have as they expand services and resources to electronic sources in the digital age (Weech 2005; Weech 2006).

In a broader view, several researchers have stressed the need for expanding digital library education. Most of those who have reviewed and studied this subject have visualized the necessary set of skills mastered by the digital librarians. For example, Spink and Cool (1999) focused on LIS schools that would offer digital library education programme. They suggested courses such as digital acquisition, digital preservation, information retrieval systems, search engines, and database architecture, to be offered. In 2001, a similar study was conducted by Saracevic and Dalbello. The major aim of their study was to present results from a survey on the state of digital library education in academic institutions. They found that about 32% of digital library courses were independent and the rest (68%) of

them were integrated into other courses. They also identified four broad areas of application in the general domain of digital library education namely tools, environments, objects, and a combination of these areas (Saracevic and Dalbello, 2001). Guided by the research question: *What do the LIS-accredited programmes inform us about education in digital libraries?*, Abrizah et al. (2009) analysed the digital library education which is included in the curriculum of 13 accredited and highly-rated library schools. They found that a significant digital library content was present in the curriculum; and the inclusion is categorised into (a) an independent or full digital library course, (b) an integrated digital library course with other LIS topics, and (c) courses with close relation to digital library processes.

Abrizah et al. (2009) also provided insights into the state of digital library education in Malaysia, and reported the findings of a small-scale survey, which has informed the LIS programme at a Malaysian university on how a digital library course should be conducted. Howard (2009) studied the viewpoint of Australian LIS educators and practitioners working in academic libraries about whether or not there is a need for an educational programme to be tailored solely for the digital library environment. According to her study, the practitioners and LIS educators had a common agreement regarding the need of the programme. Howard also specified some models and courses for a digital library educational programme. Bakar and Bakeri (2009) identified eight countries (India, Indonesia, China, South Korea, Malaysia, Hong Kong, Taiwan and Thailand) that are offering independent digital library courses through their academic institutions. According to this study, there was something missing for digital library education in Asia compared to USA and Europe, and they concluded that there is a relationship between levels of ICT development in a country with the willingness to offer digital library education. Baro (2010) brought to light the state of digital library education in library schools in Africa, and the readiness of library schools to produce future digital librarians. Baro's survey revealed that only 20 (of 45) library schools offer courses specifically related to digital libraries. In an earlier study, Bawden, Vilar and Zabukovec (2005) analyzed and compared the content of LIS programmes in Slovenia and United Kingdom. The findings revealed that the two countries were considering digital libraries as a new subject in redesigning formal education programmes, as well as, continuing training contents. Ma, O'Brien, and Clegg (2008) conducted a study to compare some international digital library course structures. The results showed that digital library module-based credit weighting varies from 13% to 63% (excluding project or dissertation work).

There have been studies that looked into the skills and key competencies of the new generation of LIS professionals in the digital environment. Choi and Rasmussen (2006), in a study entitled *What Is needed to educate future digital librarians* suggested some courses for the training and professional development LIS professionals involved in digital librarianship. Mansouri and Pashootanizadeh (2007) identified the required skills and courses that should be included in in-service education for the librarians in Iran in the digital age. The skills required for them included, professional skills (comprising operational literacy, academic literacy, information literacy, cultural literacy, and global awareness) and individual skills (comprising intelligence, creativity, power of risk, responsibility, and social relationship) (Mansouri and Pashootanizadeh 2007). Nonthacumjane (2011), who presented an introductory background of the digital era which impacts on the changes occurring in libraries, remarked that due to digitization of the knowledge-based society, libraries are faced with many kinds of changes with regards to technological aspects, user and learning behaviors, as well as social aspects. Nonthacumjane (2011) concluded that these changes have major impacts on the roles, competencies, skills and knowledge of LIS professionals. Hashim and Aziz (2012) outlined some mandatory skills for digital librarians,

and called for the research to understand how library's roles and responsibilities change in the digital environment. They noted that in the digital world, libraries and librarians do not work in isolation and the library staff should be trained to cope with new challenges.

In general, this review has analysed the digital library literature into two parts: (a) the literature that examine the LIS curriculum in terms of understanding how library schools position digital library education in their programmes, (b) the literature that propose the skills and elements which digital librarians should have. While, the subject of digital libraries started in the 1990s, most studies on digital library education were conducted in the current decade, concentrating in the USA and Europe, and a few in Asia. The importance of digital library education for digital library development and for the new generations of LIS professionals is an important matter that most of the related studies have pointed to. Indeed, there have been a small number of studies related to the Iranian LIS curricula over the years. However, the most of national studies related to LIS education recommended necessary changes in current curriculum (Dayani 2000; Fattahi 2005; Haidari 2011; Hayati, 2004; Jowkar and Hamdipour 2001; Mansouri and Pashoutanizadeh 2007; Mehrad 2008; Tahouri 2006) and did not specifically focus on the requirement of digital library education.

METHOD

This study was conducted in 2012, using a web-based survey questionnaire. It involved a purposive sampling of academic librarians from seven (7) Iranian universities and LIS educators across Iran. A snowball sampling of librarians and an expert sampling of LIS educators were used. These samples were approached and a total of 66 academic librarians and 45 educators finally made up the survey respondents.

As the study was conducted at the national level, an online questionnaire was recognized as a suitable tool for data collection. The questionnaire was designed and administered in two sets, one for the LIS educators and another for the librarians. Howard's (2009) questionnaire, which had already been tested for validity and reliability, was used, of which additional questions were included after a pilot study. Questionnaires included both open-ended and closed questions. Descriptive statistics were applied to the quantitative data contributed by the closed questions, whereas content analysis was used for qualitative data contributed by the open-ended questions.

The questionnaire comprised the following four sections: (a) Introduction to the study which includes statements such as the purpose of study, the scope of study, and a digital library definition (the definition by the Digital Library Federation [available at: <http://www.diglib.org/>] was used); (b) Demographic information which includes questions such as: gender, age, region, field of expertise, and years of experience; (c) Perspectives on digital library education model, which includes questions such as: *How much attention is paid to digital libraries in the current LIS curriculum? Is there a need for a dedicated digital library education programme? Delivery options models for DL education programme;* and (d) Familiarity on digital library curriculum and course offerings.

The digital library education model in the questionnaire was derived from the models proposed by Tammaro (2007) and Howard (2009) (with the addition of "No dedicated model required"). The models include:

- Technology as a tool for the building of digital libraries and the courses focus on technological infrastructure and processes;

- Digital libraries as environments concerned with the social and cultural contexts that digital libraries reside in;
- The digital library as composed of objects with the main focus on the management of the life-cycle of documents and artifacts in the digital environment;
- A combined model that includes different perspectives on the subject.

The digital library curriculum and courses in the questionnaire originated from following documents:

- Howard's (2009) questionnaire;
- Certificate of Advanced Study in Digital Libraries (The Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign);
- Certificate of Advanced Study in Digital Libraries (School of Information Studies, Syracuse University).

These courses were presented in the questionnaire in the forms of 20 digital library elements (and each element was to be rated as either "Highly desirable", "Desirable" or "Less desirable". The elements were : Digital library management, Preservation, Digitization, Information retrieval, Digital library architecture, Metadata, Information architecture, Digital objects, Technology, Digital repositories, Information and knowledge management, Origin and history, Web design, Social issues, Legal issues, Indexing and abstracting, Information literacy, Multimedia, Networks management, and Programming languages.

RESULTS AND DISCUSSION

A total of 66 academic librarians and 45 educators responded to the survey. The librarians comprised 44 females (67%) and 22 males (33%). Academic librarians' age range was mostly in the 30-39 (30, 45%), followed by 20-29 (19, 29%), 40-49 (14, 21%), 50-59 (3, 5%), whilst the 60+ age group attracted no response. On the other hand, 19 (42%) of LIS educator respondents were female (42%) and 26 (58%) of them were male. LIS educators' age range was 40-49 (17, 38%), followed by 30-39 (14, 31%), 50-59 (8, 18%), 20-29 (5, 11%), and only one educator (1%) belonged to the 60+ age category. Most of the LIS educator respondents acknowledged being experienced in cataloguing, research method, acquisition, scientometrics, information behavior, information retrieval, library management and technologies in libraries. Both librarians and educators are seen to be authoritative in their field gauged from their LIS working experiences, with the majority of the librarians reported having 6-10 years of working experience, followed by 11-15 years; and the majority of academics reported having 2-5 years, followed by 11-15 years. Hence, it could be expected that the librarians were aware of the LIS curriculum development, and understand the educational needs and trends in Iranian librarianship.

Perspectives on Digital Library Education

In respond to the question on their familiarity with digital libraries through the current LIS curriculum, the majority of librarians indicated "Very low" (20, 30%), followed by "Below average" (17, 26%), and Average (14, 21%). Thirteen (20%) respondents chose "Above average" and only 2 (3%) librarians indicated "Very high" familiarity. For this reason, about 80% of librarians observed that the LIS current curriculum is not visible in terms of offerings suitable skills and knowledge on digital libraries to LIS students. On the other hand, many LIS educators considered that the current LIS curriculum can expose students to

digital libraries with 20 (44%) indicated familiarity of "Below average", and another 13 (29%) "Average". Only one educator (2%) indicated "Very high" familiarity. Nine (20%) responses recorded for "Very low" familiarity, and another 2 (4%) responses recorded for "Above average". These findings indicated that both LIS educators' and practitioners' familiarity with the digital libraries curriculum content is curved towards low and below average, which implicated that the current LIS curriculum could not transfer the skills and knowledge on digital library education effectively. Digital libraries will to play an important role in serving library users and information seekers; therefore, it is imperative that the necessary digital library elements and skills associated with each element, be incorporated in designing LIS curriculum.

The next question focused on the need for a dedicated digital library education programme in Iran, and the reasons for the need. A total of 53 (80%) librarians answered "Yes", while another 13 (20%) indicated "No". Similar findings were seen in educators, where 37 (82%) felt the need for a dedicated programme, whereas 8 (18%) gave negative response. One librarian who expressed the need for this programme reasoned out the importance to keep pace with digital library technology developments: *It is necessary, for these reasons: Current and rapid ICT development increases the importance of understanding digital library concepts; The information needs and behaviors of our users have changed; and we need to keep up with IT developments; define new services and redefine current services*" (Librarian #6). Another librarian noted: *Because of technology developments and changing in information access, we need to have a dedicated digital library education programme*" (Librarian #8). Librarians also explained that because of the lack of a unified definition on digital libraries, a dedicated programme may help librarians as *"each librarian or organization has a different understanding on digital library and its concepts"* (Librarian #17).

Those librarians who did not agree with a dedicated digital library programme, felt that it should be included as part of the current LIS curriculum. Some of them quoted lack of appropriate resources such as educational spaces, educational facilities, technological infrastructure and experienced educators to start on the programme in the country. Perhaps, one of the main reasons for those who disagreed with such programme is due to the extensiveness and existence of various LIS programmes at different levels. One librarian remarked: *We don't need this, it can be integrated in the current LIS programme and there is no need to separate it* (Librarian #13). Another said: *"I assume there are no professional educators to teach this programme"* (Librarian #57).

LIS educators who agreed with a dedicated digital library programme felt that as library functional requirement changes from traditional to digital, there is a need to establish such programme. One academic remarked: *Yes, for these reasons, digital library is the inevitable future of current libraries; the world is moving towards digitizing; and new technologies require the understanding of digital libraries* (Educator #4). Another stated: *Changing of library functions and facing new challenges with digital competitors, and also, changing of information carrier are reasons to launch a new programme* (Educator #29).

LIS educators who responded "No" believed that the current LIS curriculum is suffice to offer an understanding on digital libraries to the students and the subject on digital libraries can be offered in an independent course. One remarked: *I don't agree with this programme, and I think digital library concepts should be considered in most LIS courses*" (Educator #11).

When the librarians were asked the question on how a digital library education programme should be offered, 35 (53%) librarians selected "included as part of the

coremodules in all LIS programmes". Twenty (30%) opted for "as a separate (optional) 'stream', but still within the general LIS programmes", 8 (12%) respondents chose "as a specialist (perhaps postgraduate) qualification", and another 3 indicated "Other"; for instance, Librarian #39 suggested both "as a specialist (perhaps postgraduate) qualification" and "as part of the core modules in all LIS programmes". It is perhaps surprising that an overwhelming response was that it should be "included as part of the core modules in all LIS programmes", because in an earlier response, most of the librarians (80%) agreed with a dedicated digital library programme in Iran. Although, this conflict in picking the options probably has different causes, such as ignorance of new trends in S&T and specialization of academic areas and disciplines. Another significant point is that there is consensus that digital library education is needed in Iran, but opinions surrounding how it should be offered are divided.

About the preferred models for a digital library programme, 23 librarians (35%) selected "a combined model that includes different perspectives on the subject"; 18 (27%) respondents thought that no dedicated model was required; "technology as a tool for the building of digital libraries and the courses' focus on technological infrastructure and processes" attracted 14 response (21%); "digital libraries as environments concerned with the social and cultural contexts that digital libraries reside in" with 9 response (14%) was the next appropriate model; and only 2 respondents (3%) selected "the digital library as composed of objects with the main focus on the management of the life-cycle of documents and artifacts in the digital environment" option.

On the other hand, 30 LIS educators (67%) felt that if a digital library education programme were to be introduced in Iran, it should be offered as "part of the 'core' modules in all LIS programmes (i.e.: not specialist)", 10 respondents (22%) selected "as a separate (optional) 'stream', but still within the general LIS programmes" option, and few educators (5, 11%) selected "as a specialist (perhaps postgraduate) qualification" option.

It is perhaps not surprising then that when asked about digital library education programme models, the overwhelming response was that "a combined model that includes different perspectives on the subject" (25 responses, 56%); both "digital libraries as environments concerned with the social and cultural contexts that digital libraries reside in" and "technology as a tool for the building of digital libraries and the courses' focus on technological infrastructure and processes" options attracted 6 responses (13%), while both "no dedicated model was required" and "the digital library as composed of objects with the main focus on the management of the life-cycle of documents and artifacts in the digital environment" options attracted 4 responses (9%). One of the educators noted: "Digital library education programme in developed countries should be studied and then we can use those successful experiences." (Educator #11)

Digital Library Curriculum and Course Offerings

A list of 20 digital library elements was offered to the respondents, and they were requested to rank these categories using the following scales: "Highly Desirable", "Desirable" or "Less Desirable". The "R Factor"¹ for each element was calculated. The responses for the LIS educators and librarians are tabulated in Table 1. According to the library practitioners, five elements namely Information Literacy, Digital

¹ "R Factor" or "Rank Factor" is a researchers-made factor and a kind of weighted average that is used for ranking categories in this study. The R Factor is calculated through a simple formula ($R \text{ Factor} = ((\text{Less Desirable} * 1) + (\text{Desirable} * 2) + (\text{Highly Desirable} * 3)) / 6$). The range of R Factor is 11 to 33 for Librarians and 7.5 to 22.5 for Educators.

Library Management, Digital Library Architecture, Information Retrieval, and Digital Preservation are significant in digital library education. When compared to literature on digital library education in the LIS-accredited library schools (Abrizah et al. 2009), some subjects (such as, Metadata and Legal Issues) have lesser importance in the context of Iran. The reason for this could be due to the lack of digital librarians in Iran, as such metadata-related jobs are performed by Information Technology and Computer Science graduates, mostly. Copyright and other legal issues are also important, especially in the digital environment, to establish and maintain a digital library (Samuelson and Glushko 1991). It seems, due to the low importance of legal issues in current LIS curriculum in Iran (Ministry of Science, Research and Technology [of Iran] 2012), both students and librarians are not well-aware of this aspect; while it is unavoidable to make digital libraries as commercially viable as the print industries have been (Samuelson and Glushko 1991). A few librarians had suggested courses, for example, Librarian #66 suggested a course on Digital library design standards.

Results in Table 2 suggest that what is more important for educating digital librarians in Iran could be characterized as a practice layer. This is perhaps why that an element such as "Digital Library Origins and History" has attracted less attention. Another considerable matter about practitioners' responses is the ranking of "Open Access" element. While Open Access is an important way in retrieving required information in this networked world, librarians think that it is not very necessary to embed this element in digital library education. Conversely, LIS educators had chosen Digital Library Management as the suitable element in digital library education. According to the educators, Digital Library Management, Digital Preservation, Digitization, Digital Library Architecture, and Metadata are five significant elements that should be present in digital library education.

In general, the findings seem to suggest that the technical aspect of digital library education in the educators' perspectives is stronger than that of the librarians'. However, the two groups shared the same opinion about the Digital Library Origins and History and Programming Languages elements. The comparison between the two categories of respondents (librarians and educators) could help us to extract appropriate elements to digital library education in relation to theory and practice. By comparing their perspectives, we could find the gap between what elements they regarded as important in theory and practice in Iran (Table 2). For example, the rank of "Information Literacy" and "Digitization" elements from librarians and educators' viewpoints shows this gap, properly. On the other hand, the educators well-understood about Metadata, but they seemed to ignore the importance of Legal Issues in digital library education. The course offerings for digital library education should be revised at certain periods; because the technology and digital world is a dynamic environment, and the educational curriculum in such environments must be adapted to new changes.

Table 1: The Presence of Digital Library Elements in the LIS Curricula as Rated by LIS Educators and Academic Librarians

Elements	Less Desirable (f)		Desirable (f)		Highly Desirable (f)		R Factor	
	Librarians	LIS Educators	Librarians	LIS Educators	Librarians	LIS Educators	Librarians	LIS Educators
Information Literacy	6	6	18	22	42	17	28.00	16.83
Digital Library Architecture (e.g. application software, protocols (OAI-PMH etc), interoperability)	4	2	22	15	40	28	28.00	19.33
Information Retrieval (e.g. Semantic web, natural language processing, ranking algorithms)	4	0	22	18	40	27	28.00	19.50
Indexing and Abstracting Services	2	5	26	18	38	22	28.00	17.83
Digital Library Management (e.g. planning and implementing (project management), human resources, marketing, quality, evaluation)	6	0	20	8	40	37	27.67	21.17
Information Architecture (e.g. structural design, organizing and labeling of websites, intranets)	5	1	22	17	39	27	27.67	19.33
Digital Preservation (e.g. OCR, Text encoding standards, strategic issues (selection, policy making etc.), web archiving)	6	1	21	10	39	34	27.50	20.50
Digital Objects (e.g. file formats, migration)	3	1	27	17	36	27	27.50	19.33
Technology of digital libraries (e.g. XML, XSLT, Database modeling, SQL)	3	1	29	17	34	27	27.17	19.33
Multimedia	2	5	31	20	33	20	27.17	17.50
Social issues of digital libraries (e.g. computer literacy, cultural biases such as language, ethics and equality – the “digital divide)	7	3	22	18	37	24	27.00	18.50
Information and Knowledge Management	7	4	26	14	33	27	26.33	18.83
Telecommunications and Networks Management	7	8	26	20	33	17	26.33	16.50
Digitization (e.g. conversion of analogue to digital)	4	1	32	15	30	29	26.33	19.67
Web design and maintenance (e.g. application of markup languages, CSS, Information Architecture principles)	5	4	33	16	28	25	25.83	18.50
Metadata (e.g. Dublin Core, METS, PREMIS, folksonomies)	9	2	29	15	28	28	25.17	19.33
Legal Issues (e.g. copyright, contract law, Digital Rights Management)	11	3	26	18	29	24	25.00	18.50
Digital Repositories (e.g. Open Access)	7	1	38	18	21	26	24.33	19.17
Programming Languages (e.g. Java, C++, Visual Basic)	13	12	28	21	25	12	24.00	15.00
Digital library origins and history (e.g. conceptual frameworks, models and theories)	4	4	50	26	12	19	23.33	18.83

Table 2: LIS Educators and Librarians Perspectives’ on the Presence of Digital Library Elements in the LIS Curricula Based on Ranked Order

	Digital library element	Rank	
		LIS educators	Librarians
1	Digital Library Management (e.g. planning and implementing (project management), human resources, marketing, quality, evaluation)	5	1
2	Digital Preservation (e.g. OCR, Text encoding standards, strategic issues (selection, policy making etc.), web archiving)	7	2
3	Digitization (e.g. conversion of analogue to digital)	14	3
4	Information Retrieval (e.g. Semantic web, natural language processing, ranking algorithms)	3	4
5	Digital Library Architecture (e.g. application software, protocols (OAI-PMH etc), interoperability)	2	5
6	Metadata (e.g. Dublin Core, METS, PREMIS, folksonomies)	16	6
7	Information Architecture (e.g. structural design, organizing and labeling of websites, intranets)	6	7
8	Digital Objects (e.g. file formats, migration)	8	7
9	Technology of digital libraries (e.g. XML, XSLT, Database modeling, SQL)	9	7
10	Digital Repositories (e.g. Open Access)	18	10
11	Information and Knowledge Management	12	11
12	Digital library origins and history (e.g. conceptual frameworks, models and theories)	20	12
13	Web design and maintenance (e.g. application of markup languages, CSS, Information Architecture principles)	15	13
14	Social issues of Digital libraries (e.g. computer literacy, cultural biases such as language, ethics and equality – the “digital divide)	11	14
15	Legal Issues (e.g. copyright, contract law, Digital Rights Management)	17	15
16	Indexing and Abstracting Services	4	16
17	Multimedia	10	17
18	Information Literacy	1	18
19	Telecommunications and Networks Management	13	19
20	Programming Languages (e.g. Java, C++, Visual Basic)	19	20

Based on the comparison between the library practitioners and educators perspectives to the suitability of different elements in a digital library education programme, LIS curriculum developers may identify which elements should be given more emphasis, which categories could be merged in broader subjects, and which one could be designed as an optional element in the LIS curriculum. In the current study we found a significant gap between theory and practice, especially in relation to Information Literacy, Digitization, Indexing and Abstracting Services, Metadata, Digital Repositories, and Digital Library Origins and History. Academic institutions and library schools should care about the practical and market needs for LIS services.

CONCLUSION

A proper digital library education programme can improve digital libraries development and is a vital component to live librarians at the digital age. To share digital library knowledge and skills to the next generation, we have to educate new digital library educators. Indeed, education is based on four fundamental elements; “environment, learner, educators and what are to be learnt (curriculum)” (Ashman and Conway 1997, p. 124). The required skills for digital library concepts are very complex and rapidly changing. These skills need a different educational philosophy that is more related to a structuralism approach. Conducted studies around the world and at different times have stressed the need for digital library education.

LIS discipline requires digital library education to keep up with new developments in the ICT fields. The current approach in the Iranian LIS curriculum is not appropriate to fulfill this need and should be changed from a static to a dynamic approach. The absence of a stand-alone programme on digital libraries in the current LIS curriculum indicates that the Iranian LIS academic community has not considered to implement one, although there have been national studies that emphasized on this need (such as, Mohsenzadeh and Isfandyari- Moghaddam, 2011; Norouzi 2008; Tahouri 2006). This study has also revealed similar findings as evidenced by the high percentage of agreement among the librarians (80%) and LIS educators (82%) on the requirement to establish digital library education. The revision of the LIS curriculum, incorporating digital library elements in this study should be considered as a normal and significant process in Iran. LIS educators need to work with researchers and practitioners in digital libraries to help develop an appropriate curriculum. Based on the findings, digital library skills and knowledge – the conceptual, semantic, syntactic and technical aspects – should be embedded in digital library-related courses. Having obtained the empirical data to support the needs, the next step of using this information is to define digital library education requirements and curricula inclusions which would best facilitate the development of digital library skills and knowledge to be undertaken in Iran.

There is very little extant empirical data available which would allow a comparison with current study. Howard’s (2009) research and also Mohsenzadeh and Isfandyari-Moghaddam’s (2011), for example, support the results of this study. Other studies in the field, have also found such results that would facilitate educational content aligned to new requirements and demands. However, there were a few differences between the required skills and elements in Howard’s (2009) and the current study, which are probably due to the LIS educators’ and librarians’ academic background and professional experience, as well as the research context.

Besides having implications to the LIS curriculum developers and policy-makers in Iran, the results of the study have also practical implications for national professional bodies, which might be expected to be able to adapt digital library education in their professional development programmes. Although, the issue of an appropriate curriculum and educational board for digital library education programme will remain unsolved in the context of Iran, another study might be able to examine this problem. While due to cultural and social issues, the results of this research may not be useful to other regions, however comparative studies can open new windows to digital library education worldwide.

ACKNOWLEDGEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Thank you to Katherine Howard (Australia) for helping us in the completion of this paper. Furthermore, we appreciate Caoimhin Moroney's efforts in editing this paper. This is an extended version of a paper presented at the 5th. International Conference on Asia-Pacific Library & Information Education & Practice (ALIEP-2013) in Khon Kaen, Thailand, 10-13 July 2013.

REFERENCES

- Abrizah, A., Noorhidawati, A., Hilmi, M.R. and Azeana, D. 2009. What do the accredited LIS programmes inform us about education in digital libraries? *Malaysian Journal of Library and Information Science*, Vol.14, No.3: 77-93.
- Ashman, A. F. and Conway, R.N.F. 1997. *An introduction to cognitive education: theory and applications*. Oxford: Routledge.
- Bakar, Ahmad Bakeri Abu, and Bakeri, Ahmad. 2009. Education for digital libraries in Asian countries. In *Asia-Pacific Conference on Library & Information Education*: 458-463. Available at: <http://www.slis.tsukuba.ac.jp/a-liep2009/proceedings/Papers/a25.pdf>
- Baro, E. E. 2010. A survey of digital library education in library schools in Africa. *OCLC Systems and Services: international digital library perspectives*, Vol.26, No.3: 214-223.
- Bawden, D., Vilar, P. and Zabukovec, V. 2005. Education and training for digital librarians: a Slovenia/UK comparison. *Aslib Proceedings: New Information Perspectives*, Vol.57, No.1: 85-98.
- Buckland, Micheal. 1992. *Redesigning library services: a manifesto*. Chicago and London: American Library Association.
- Choi, Y. and Rasmussen, E. 2006. What is needed to educate future digital librarians?. *D-Lib Magazine*, Vol.12, No.9. Available at: <http://www.dlib.org/dlib/september06/choi/09choi.html>
- Clegg, W., Ma, Y. and O'Brien, E.A. 2006. *Digital library education: the current status*. In: *Proceedings of the 6th ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL 2006)*, Chapel Hill, NC, USA, 11-15 June 2006: 165-174.
- Coleman, A.S. 2002. Interdisciplinarity: The Road Ahead for Education in Digital Libraries. *DLib Magazine*, Vol.8, No.7-8. Available at: <http://arizona.openrepository.com/arizona/bitstream/10150/105984/1/07coleman.html>
- Dayani, M. H. 2000. Barnameye Amoozeshe Doreye ... (LIS BA Programme: Recommendations to Transformation). *Ketabdari va Ettela'rasani*, Vol.3, no.8: 1-21.
- Fadaei, G. 2009. A'yandey-e Ketabdari ... (The Future of LIS). *Majalleh Ketabdari*, Vol.46, No.2: 95-109.
- Fattahi, R. 2005. Barnameye Jadid-e (New LIS Curriculum for MA Degree). *Ketabdari va Ettela' Rasani*, Vol.8, No.2.
- Fattahi, R. 2006. The new M.A. curriculum for librarianship and information science: The report of a research project. *Iranian Journal of Information Science and Technology*, Vol.4, No.2: 69-81.
- Haidari, G. 2011. Amoozeshe Ketabdari va Elme Etela'at dar Iran ... (Education of Librarianship and Information Science in Iran: Contraindications and Solutions). *Ketabdari va Ettela' Rasani*, Vol.14, No.2: 71-105.
- Hasanzadeh, M. and Ghauri, Z.. 2010. Didgahe Jame'ye Ketabdari ... (Viewpoint of Library and Information Science Society about the Change in Content, Education, and the Title of LIS). *Research on Information Science and Public Libraries*, Vol.16, No.3: 59-85.

- Hayati, Z. 2004. Amoozeshe Ketabdari Dar Iran ... (LIS Education in Iran: The Past, Present, Future). *Faslname Ketab*, vol.15, no.1: 25-41.
- Howard, K. 2009. (*Digital Library*) *Education or Digital (Library Education): an Australian perspective*. MA thesis. Charles Sturt University, Canberra.
- Isfandiari-Moghadam, A. and Bayat, B. 2007. Digital libraries in the mirror of the literature: issues and considerations. *Electronic Library, The*, Vol.26, No.6: 844-862.
- Jowkar, A. and Hamdipour, A. 2001. Niaz Be Tahavol Barnamehaye Darsi (Need to Revising LIS Curriculum at BA Degree). *Ketabdari Va Etela'resani*, Vol.4, No.2: 9-25.
- Koulouris, A. and Kapidakis, S. 2012. Policy route map for academic libraries' digital content. *Journal of Librarianship and Information Science*, Vol.44, No.3: 163-173.
- Laili, H.H. and Rafidah, Abdul Aziz. R.A. 2012. *Preparing librarians for digital future*. Available at: <http://dspace.unimap.edu.my/dspace/bitstream/123456789/22194/1/Praparing%20Librarians%20for%20Digital%20Future%20EDIIT.pdf>
- Liu, Y.Q. 2004. Is the education on digital libraries adequate?. *New Library World*, Vol.105, No.1196/1197: 60-68.
- Mansouri, A. and Pashootanizadeh, M/. 2007. Amoozeshe Zemne Khedmat ... (In-Service Education for Librarians in the New Age). *Motalea't Melli Ketabdari va Sazmandehie Etela'at*, vol.18, no.2: 13-24. Available at: http://journals.nlai.ir/faslname/files/site1/user_files_9078a9/zrezaei-A-10-12-626-fb2b389.pdf
- McCray, A. T. and Gallagher, M.E. 2001. Principles for digital library development. *Communications of the ACM*, Vol.44, No.5: 49-54.
- Mehrad, J.. 2008, April 17. Amoozeshe ketabdari va etela'resani .. (lis education in iran still remains stagnant). *IBNA*. Available at: <http://www.ibna.ir/vdcbgw9q.ak97n4prra.html>
- Ministry of Science, Research and Technology [of Iran]. Humanities Group. 2012. Moshakhasat-e kolli ... (Specifications, programmes, and curriculum of LIS (at 6 programmes), Approved at three hundred and twenty-fourth meeting of planning council, date: Khordad 31, 1388/June 21, 2009). Available at: <http://prog.msrt.ir/Subsystem/VProg/Training/Report/TrainingOtherPeople.aspx>
- Mohsenzadeh, F. and Isfandiari-Moghadam, A. 2011. Perceptions of library staff regarding challenges of developing digital libraries: The case of an Iranian university. *Program: Electronic Library and Information systems*, Vol.45, No.3: 346-355.
- Mortezaie, L. 2001. Tahsilat-e Takmili-e ... (Graduate courses in library and information studies in the UK, USA, India and Iran: A comparative case study). Tehran: Irandoc.
- Mortezaie, L. and Naghshineh, N. 2002. A comparative case study of graduate courses in library and information studies in the UK, USA, India and Iran: lessons for Iranian LIS professional. *Library Review*, Vol.51, No.1: 14-23.
- Myburgh, Sue. 2003. Education directions for new information professionals. *Australian Library Journal*, Vol.52, No.3: 213-228.
- Nonthacumjane, P. 2011. Key skills and competencies of a new generation of LIS professionals. *IFLA Journal*, Vol.37, No.4: 280-288. Available at: http://www.ifla.orgwww.ifla.org/files/assets/hq/publications/ifla-journal/ifla-journal-37-4_2011.pdf#page=16
- Norouzi, A. 2008. Barnameye Amuzesh-e ... (LIS curriculum should be Revised). *IBNA*. Available at: <http://www.ibna.ir/vdcb8gb5.rhb8wpiuur.html>
- Samuelson, P. and Glushko, R.J. 1991. Intellectual property rights for digital library and hypertext publishing systems: an analysis of Xanadu. *Harvard Journal of Library and Technology*, Vol.6, No.237: 39-50. Available at: <http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=2377&context=facpubs>

- Saracevic, T. and M. Dalbello. 2001. A survey of digital library education: libraries in the digital age. Dubrovnik, s.n.
- Spink, A. and Cool, C. 1999. Education for digital Libraries. *D-Lib Magazine*, Vol.5, No.5. Available at: <http://dlib.org/dlib/may99/05spink.html>
- Tahouri, Z. 2006. Lozum-e Baznegari Dar (Need to revise LIS Curriculum Regards to New LIS Skills). *Motalea't Melli Ketabdari va Sazmandehie Etela'at*, Vol.17, No.1: 143-162. Available at: http://journals.nlai.ir/fasname/files/site1/user_files_9078a9/zrezaei-A-10-12-748-8809cba.pdf
- Tammaro, A.A.M. 2007. A Curriculum for Digital Librarians: A Reflection on the European Debate. *New Library World*, vol.108, no.5/6: 229-246.
- Wang, J. 2003. Knowledge Network Constructed by Integrating, Classification, Thesaurus and Metadata in Digital Library. *International Information & Library Review*, Vol.35, No.4: 383-397.
- Weech, T. 2005. Analysis of courses and modules: Education for digital librarianship. Villa Morghen, Firenze, 24-25 March 2005, University of Parma. Available at: <http://dSPACE-unipr.cilea.it/bitstream/1889/482/1/Weech.pdf>
- Weech, T. 2006. Guidelines: Education for Digital Librarianship. December 30, 2006. Available at: http://archive.ifla.org/VII/s23/pub/FinalReport_SETproject2006.pdf
- Yang, S., Fox, E. A., Wildemuth, B. M., Pomerantz, J., and Oh, S.. 2006. Interdisciplinary curriculum development for digital library education. *Digital Libraries: Achievements, Challenges and Opportunities. Springer Berlin Heidelberg*: 61-70. Available at: <http://curric.dlib.vt.edu/DLcurric/icadl06-dlcurric.pdf>
- Yang, S., Wildemuth, B. M., Pomerantz, J., Oh, S., and Fox, E. A. 2009. Core Topics in Digital Library Education. In: S. F. D. G. & J. N. Y. Theng, ed. *Handbook of Research on Digital Libraries: Design, Development, and Impact*. s.l.:IGI Global: 493-505.

