CHAPTER – VII

SUMMARY AND CONCLUSION
7.0 Introduction

The proliferation of medical information today has caused users increasingly feel difficult to cope with the information overload phenomena. According to Nweke (1992, Cited in Adeyoyin, 2005, p. 257) knowledge has developed to such an extent that it is practically impossible for library users or information seekers to be conversant with all aspects of their fields of specialization.

In view of the challenges posed by information explosion, medical libraries and information centres have exploited information and communication technologies for information input, storage, organization, processing, retrieval, and dissemination. The penetration of ICT into medical libraries along with the challenges it poses has transformed medical libraries to an ever-changing environment.

There are three major aspects to this change; new technology, and the potential for new services, which it brings; the demands and expectations of library users; and librarians own changing expectations for education and training on the state of the art.

The rapidly growing availability of digital information which largely includes indexing and abstracting services, scholarly journals and digital copies of material originally issued in print is fast transforming library services and the experience of library users (Adedeji, 2001, Cited in Adeyoyin, 2006, p. 698). Hence, In order to be able to use ICT effectively to discharge their professional responsibilities, medical librarians in India and Iran need to acquire knowledge of skills in information technology.

Several scholarly writings have focused on the issue of inevitability of IT-based skills among librarians in general and medical librarians in particular in the emerging IT era. Authors include (Safahieh and Asemi, 2010; Mathews and Pardue, 2009; Heinrichs, 2008; Ameen, 2008; Kavulya, 2007; Abu Bakar, 2005; Gosine-Boodoo and McNish, 2005, Mahmood, 2003; Brown, 2004; Scherrer, 2004; Scherrer and Jacobson, 2002; Funk, 1998; Blackwelder and Dimitroff, 1996; Braude and Wood, 1993; Morgan, 1996). Therefore without controversy, the Indian and Iranian medical librarians of the 21\textsuperscript{st} century should either sit up, retrain, adapt and be a part of the sweeping change or be ready to be swept by the wind of change that is blowing in IT world.
7.1 Issues Studied and Analyzed

The main objective of the investigation was to study and compare information technology skills among LIS professionals of medical (Medical, Dental, and Pharmacy) libraries in India and Iran. In particular, this thesis aims to find out medical librarians’ level of skills in: automated systems, data standards, and System Analysis Techniques; acquisition, use, and evaluation of information technologies; integrated systems and technologies; Technology solution for permanent access to electronic information; applications of emerging areas of biomedicine, computational biology and health information, including electronic health care systems and records; communication and information infrastructure including the Internet and Web; creating information access and delivery solutions; and databases, indexing, and information analysis and synthesis;

The thesis also attempts to understand medical librarians’ preferences for training agencies, and mode of IT training for upgrading their knowledge and skills, it further attempts to unfold the obstacles that impede acquiring information technology skills by medical librarians and thereby endeavour to bridge the gaps for the enhancement of medical librarians’ information technology skills.

7.2 Methodology

A survey method of research has been adopted to collect primary data about medical librarians’ IT skills, both in India and Iran. A well-structured questionnaire containing various IT skills was designed to be administered to medical librarians in India and Iran. Standards and benchmarks for IT skills recommended by professional library (medical and non-medical i.e. MLA and SLA) associations have been used while designing the questionnaire.

Informal interview with selected librarians was also conducted to improve the reliability of the data and to enhance the quality of research. To collect the primary data on IT skills among medical librarians, the researcher identified 135 medical, dental, and pharmacy colleges in India, and 76 medical, dental, and pharmacy colleges in Iran. Two hundred and eleven questionnaires were distributed among chief librarians, through e-mail, mail, and personal visits, out of which 166 (101 India and 65 Iran) useable
questionnaires were returned, giving the response rate of 78.7%. The data thus obtained was analyzed in the light of objectives of the study. The Statistical Package for Social Science (SPSS) was employed to analyze the data and to test the hypotheses. The significance levels were fixed at a minimum of 0.05 levels. The results of the study together with other details have been reported in the form of tables, charts and figures. They have been used to make the presentation clear and simple and lucid. While detailed study and interpretation of data is presented in chapters V, and VI, the summary of findings of the study are listed in the succeeding section.

7.3 Summary of the Findings

Medical librarians’ Overall Attitude to Information Technology

1. Analysis revealed that, more than half (54.3%) of the respondents indicated that they are ‘heavy users of ICT (IT) and generally comfortable with it’, where more than half (63.1%) of respondents are in Iran versus nearly half (48.5%) of Indian respondents. It is followed by 24.4% of respondents who claimed to be ‘Heavy users of ICT (IT) but have some concerns about it’ where one third (33.8%) of the respondents belong to Iran and less than one-fifth (18.2%) are Indian respondents. Few respondents in India indicated that they ‘Don’t feel one way or the other about ICT (IT)’, whereas no respondents in Iran indicated to be indifferent about ICT. Finally, very few (3.1%) Iranian respondents claimed that they ‘Don’t know much about ICT (IT) but worry about being left behind’, while about one-fifth (18.2%) of Indian respondents felt that they ‘Do not know much about ICT, but worried about being left behind’. It can be concluded that more than half 54.3% of respondents are generally comfortable with ICT (Table 13 and Figure 4).

Access to and Usage of Information Technology Applications and Systems

2. More Indian librarians indicated that regularly used applications such as ‘PC based education/training’ (59.7%) \((CC=.316, \ P=.000<.05)\), ‘Word Processing’ (80.3%) \((CC=.223, \ P=.008<.05)\), ‘Database packages’ (65.6%) \((CC=.267, \ P=.002<.05)\), and ‘Spreadsheet package’(67.7%) \((CC=.340, \ P=.000<.05)\),
whereas in Iran more respondents indicated to have access to these applications than Indians, scoring 73.7%, 40.7%, 62.1%, and 68.4%, respectively. Further, the obtained Contingency Coefficient in these areas was found to be significant showing association between the statements and responses for India and Iran. (Table 14)

3. In ‘Desktop Publishing’ and ‘Multimedia authoring’ the situation is the same in both countries where respondents have more access than regular use in India (54.7%, 63.8% vs. 45.3, 36.2%) and Iran (75.0%, 87.8% vs. 25.0%, 12.2%). However, due to the fact that more respondents in India than their Iranian counterparts have access to these applications, the obtained Contingency Coefficient in ‘Desktop Publishing’ (CC = .207, P = .034 < .05) and ‘Multimedia authoring’ (CC = .266, P = .010 < .05) for both countries were found to be significant indicating a significant association between the statement and response for both countries. (Table 14)

4. In other areas such as Presentation software, CD-ROM/DVD, Circulation system, Electronic acquisition, Electronic cataloging, OPACs, Intranet, Video-conferencing, and Fax the proportion of respondents having “Access” and “Regularly Use” are similar in both countries and the calculated Contingency Coefficient in each case does not show a significant association between the statement and response for both countries (Table 14).

**Frequency of Information Technology Usage**

5. Of 166 respondents in India and Iran, 146 (88.0%) used information technologies on a ‘Daily’ basis either at work or at home, where 64 of them were in Iran and 82 were in India, representing 98.5%, and 81.2%, respectively. Few respondents in India (8; 7.9%) indicated that used IT ‘Rarely’. Whereas, no Iranians used IT ‘Rarely’. Very few Indian respondents used IT ‘Thrice Weekly’, and ‘Fortnightly’, scoring 4.0% each. Whilst, just 1.5% of respondents in Iran used IT ‘Fortnightly’. Data analysis showed that only 3.0% of Indian librarians used IT ‘Monthly’, whereas no Iranians used IT ‘Monthly’. (Table 15)
Experience of Using Information Technology

6. Analysis revealed that nearly one-third of respondents in India (32.7%) had ‘4-6 Years’ experience of using IT, whereas almost one-fourth (23.1%) of respondents in Iran had ‘4 - 6 Years’ experience of using IT. It was found that, 36.9% of respondents in Iran had ‘More than 10 Years’ experience of using IT, whereas only 17.8% of their Indian counterparts had the same length of time of experience in using IT. Analysis revealed that, about one-third (30.8%) of Iranians had ‘7 – 10 Years’ experience of using IT, whilst only 14.9% of Indian respondents had the same length of time of experience in using IT (Table 16). nearly one-fifth of Indians had ‘1- 3 Years’ of experience in using IT, while few (9.2%) Iranians had the same length of experience in using IT. Only (13.9%) of respondents in India have ‘less than 1 Year’ of experience in using IT, but no Iranians have ‘less than 1 Year’ of experience in using IT. (Table 16)

7. It can be concluded that majority of respondents in both countries have ‘4 – 6 Years’ (28.9%) and ‘More than 10 years’ (25.3%) of experience in using IT (Figure 5).

Skills in Automated Systems, Data Standards, and System Analysis Techniques

8. Based on mean scores of skills in ‘Automated Systems’ it can be concluded that Iranian respondents possess skills in ‘Integrated Library Management systems’ (mean= 4.49), ‘Bibliographic Utilities’ such as OCLC, and LocatorPlus (mean=3.98), and ‘Technologies Used for Reference Services’ (mean=3.87), but they do not possess required skill in ‘Information Retrieval Systems’ (mean=2.81) such as CDS/ISIS. On the other hand, respondents in India possess required skill in ‘Integrated Library Management systems’ (mean=3.22) such as Koha, NewGenLib, Libsys, etc., but lack skills in ‘Technologies Used for Reference Services’ (mean= 2.95), ‘Information Retrieval Systems’ (mean= 2.62), and ‘Bibliographic Utilities’ (mean=2.42) (Table 17)

9. According to the calculated mean scores, medical librarians in Iran (mean=15.06) possess significantly higher level of skills in automated systems
than their Indian (mean= 11.25) counterparts (t=-6.286, df= 142, p=.000<.05). (Table 18)

10. Regarding skills in ‘Data Standards’, It was observed that Iranian respondents possess appropriate skills in ‘MeSH (Medical Subject Headings)’ (mean=4.29), ‘LCSH (Library of Congress Subject Headings)’ (mean=4.14), ‘AACR2 (Anglo American Cataloguing Rules)’ (mean=3.80) and ‘MARC21 (Machine readable Cataloging)’ (mean=3.26), but they do not possess required skills in ‘Z39.50’ (mean=2.85), ‘DC (Dublin Core)’ (mean= 2.28), and ‘RDF (Resource Description Framework)’(mean=2.12). On the other hand, respondents in India possess required skills just in ‘AACR2’ (mean=3.26), but lack required skills in ‘MeSH’ (mean=2.97), ‘LCSH’ (mean=2.90), ‘MARC21 (mean= 2.76)’, ‘DC’ (mean=2.41), ‘RDF’ (mean=2.23) and ‘Z39.50’ (mean=2.06) (Table 19).

11. It was found that, medical librarians in Iran (mean=21.88) possess significantly higher level of skills in ‘Data Standards’ than their Indian (mean=18.93) counterparts (t= -2.525, df=116, p=.013<.05). (Table 20)

12. Independent-Samples t-test, showed a significant difference between Indian and Iranian medical librarians’ skills in automated systems, and data standards. (t= -3.799, df= 110, p= .000<.05). Therefore, the null hypothesis is rejected. i.e Medical librarians in Iran (mean=21.88) have significantly higher level of skills in automated systems, and data standards than Indians (mean=18.93). (Table 21) (Hypothesis 1)

13. Indians’ skills scores in system analysis techniques are as follows: ‘Problem identification’ (mean= 2.87), ‘Operation and support’ (mean= 2.82), ‘Requirement analysis’ (mean=2.80), ‘Decision analysis’ (mean= 2.77), ‘System implementation or design’ (mean=2.71), and ‘Preliminary investigation’ (mean= 2.69). On the other hand, Iranians’ skills scores in system analysis are as follows: ‘Preliminary investigation’ (mean= 2.81), ‘Requirement analysis’ (mean=2.75), ‘Decision analysis’ (mean= 2.73), ‘Operation and support’ (mean= 2.66), ‘Problem identification’ (mean= 2.64), and ‘System implementation or
design’ (mean=2.71). Based on the mean scores of skills in ‘System Analysis Techniques’ it can be concluded that Indian and Iranian respondents do not possess appropriate skills in any techniques of System analysis. (Table 22)

14. The comparison of the mean scores shows a non-significant difference between, Iranian (mean=16.53) medical librarians’ and Indian (mean=16.67) medical librarians’ level of skills in system analysis techniques \( (t=.568, df=164, p=.571>.05) \). (Table 23)

**Skills in Acquisition, Use, and Evaluation of Information Technologies**

15. Based on the mean scores of skills in ‘Acquisition, Use and Evaluation of Information Technologies’ it can be concluded that Indian (mean= 2.80) and Iranian (mean= 2.82) respondents do not possess appropriate skills in ‘Transaction Log Analysis’. However they possess the required skills in ‘Technical Skills in Computers’ (mean= 3.61, vs. mean=3.93), ‘Comparing Hardware/Software Technologies’ (mean= 3.13 vs. mean= 3.32), ‘Using electronic resources’ (mean= 3.11 vs. mean= 3.66) and ‘Electronic Resource Assessment/Management Systems’ (mean=3.01 vs. mean=3.16). (Table 24)

16. According to calculated mean scores, medical librarians in Iran (mean= 17.13) possess higher level of skills in ‘Acquisition, use and Evaluation of Information Technologies’ than their Indian (mean= 15.63) counterparts \( (t= -2.542, df=154, p=.012<.05) \). (Table 25)

**Skills in Integrated Systems and Technologies**

**Federated /Meta Search Engines**

17. Regarding ‘Federated/Meta Search Engines’ skills, it was concluded that Indian (mean=3.45) and Iranian (mean= 4.26) respondents possess required skills in ‘Google Scholar’. However they do not possess the required skills in other search engines including ‘Scirus’ (mean= 2.42 vs. mean= 2.78), ‘Dogpile’ (mean= 2.05 vs. mean= 2.10), ‘Mamma’ (mean= 2.20 vs. mean= 2.10) ,
Vivisimo’ (mean= 2.42 vs. mean= 2.78), and ‘Kartoo’ (mean= 2.04 vs. mean= 1.86). (Table 26)

18. The calculated mean scores of skills in ‘Federated/Meta Search Engines’ demonstrated that medical librarians’ level of skills do not differ in India (mean= 14.2) and Iran (mean= 15.07) regarding skills in Federated/Meta search engines. (t= -1.141, df=111, p=.268>.05). (Table 27)

**Radio Frequency Identification (RFID)**

19. The mean scores of medical librarians’ skills in RFID shows that neither Indian (mean= 2.29) medical librarians nor Iranians (mean=2.16) possess appropriate level of skills in Radio Frequency Identification technology. (Table 28)

20. It was found that, medical librarians’ level of skills in RFID (Radio Frequency Identification) do not differ in India (mean= 2.29) and Iran (mean= 2.16), (t=.710, df=164, p= .479>.05). (Table 28)

**Web-based Knowledge Management**

21. Data analysis made it clear that Indian and Iranian respondents do not possess required skills in web-based KM tools such as ‘SNS (Social Networking Services)’ (mean= 2.98 vs. mean= 2.56), ‘Wikis’ (mean= 2.77 vs. mean= 2.56), ‘RSS (Really Simple Syndication)’ (mean= 2.72 vs. mean= 2.73) , ‘Blogs’ (mean= 2.71 vs. mean= 2.55), ‘Mashups’ (mean= 2.35 vs. mean= 2.21), ‘Artificial Intelligence’ (mean= 2.19 vs. mean= 1.93), and ‘Ontology/Taxonomy’ (mean= 2.13 vs. mean= 2.04). (Table 29)

22. The Independent-Samples t-test showed a non-significant difference between, Iranian (mean=16.78) and Indian (mean=17.88) medical librarians’ skills in Web-based KM tools (t=.948, df=112, p=.345>.05). (Table 30)

**Content Development Tools**

23. Data analysis demonstrated that, the Iranian respondents do not possess required skills in any content development tools, listed in this study, except ‘Intranet’
Further, Indian medical librarians do not possess required skills in any of content development tools including ‘Intranet’ (mean=2.45), ‘Portal’ (mean=2.44), ‘Digital Libraries’ (mean=2.64), ‘Virtual Learning Environment’ (mean=2.27), ‘Referencing software’ (mean=2.23), ‘Learning Objects’ (mean=2.25), ‘Digital Asset Management Systems’ (mean=2.49), ‘Virtual Reference Services’ (mean=2.36), ‘Meta Search Systems’ (mean=2.46), ‘Metadata systems’ (mean=2.40), ‘Optical Character Recognition (OCR)’ (mean=2.50), ‘Content Management Systems’ (CMS) (mean=2.25), ‘Open-URL Link Resolver’ (mean=2.24), ‘Remote Patron Authentication’ (mean=2.26), ‘Electronic Reserve Systems (ERS)’ (mean=2.45), and ‘Programming Languages’ (mean=2.35). (Table 31)

24. It was found that, there is no significant difference between, Iranian (mean=39.64) and Indian (mean=38.13) medical librarians’ level of skills in content development tools \( (t= -.697, df=164, p=.487>0.05) \). (Table 32)

25. The Independent-Samples t-test detected no significant difference between Indian and Iranian medical librarians’ skills in Web-based knowledge management and content development tools \( (t= -.144, df=164, p=.886>.05) \). Therefore, the null hypothesis is supported. i.e. Medical librarians’ level of skills in Web-based knowledge management and content development do not differ in India (mean=56.01) and Iran (mean=56.43). (Table 33) \( \text{(Hypothesis 2)} \)

**Skills in Technological Solutions for Permanent Access to Electronic Information**

**Digital Archiving and Preservation**

26. Regarding skills in ‘Digital Archiving and Preservation’, the mean scores of medical librarians’ skills shows that neither Indian (mean=2.63) medical librarians nor Iranians (mean=2.60) possess appropriate level of skills in digital archiving and preservation. (Table 34)
27. According to the calculated mean scores, medical librarians’ level of skills in ‘Digital Archiving and Preservation’ do not differ significantly in India (mean= 2.63) and Iran (mean= 2.60) \( t= .200, \ df= 164, \ p= .841>.05 \). (Table 34)

Skills in Applications of Emerging Areas of Biomedicine, Computational Biology and Health Information, Including Electronic Health Care Systems and Records

**Bioinformatics/Computational Biology Databases**

28. Indians skills scores in ‘Bioinformatics/Computational Biology Databases’ is as follows; ‘SWISS-PROT’ (mean= 2.39), ‘GenBank’ (mean= 2.31), ‘European Molecular Biology Laboratory’ (mean= 2.28), ‘DNA Data Bank of Japan’ (mean= 2.23), and ‘Protein Identification Resource’ (mean= 2.22). On the other hand Iranians’ skills scores in ‘Bioinformatics/Computational Biology Databases’ is as follows; ‘SWISS-PROT’ (mean= 2.47), ‘GenBank’ (mean= 2.47), DNA Data Bank of Japan’ (mean= 2.33), ‘European Molecular Biology Laboratory’ (mean= 2.30), and ‘Protein Identification Resource’ (mean= 2.22). Based on the mean scores of skills in ‘Bioinformatics/Computational Biology Databases’ it can be concluded that, Indian and Iranian respondents do not possess appropriate skills in any above mentioned databases. (Table 35)

29. The comparison of mean scores exhibited that, medical librarians’ level of skills in Bioinformatics/Computational Biology Databases’ do not differ significantly in India (mean=11.38) and Iran (mean=11.74) \( t=-.578, \ df=155, \ p=.564>0.05 \). (Table 36)

**Standards for Medical Systems**

30. As far as skills in ‘Standards for Medical Systems’ is considered it was found that Indian and Iranian respondents do not possess adequate skills in any standards for medical systems listed in this study including DICOM (Digital imaging and communication in Medicine) (mean= 2.12 vs. mean=1.61); HL7 (Health Level Seven) (mean= 2.12 vs. mean=1.61); RxNorm (Normalized Names for clinical drugs) (mean= 2.11 vs. mean=1.96); SNOMED (Systematized Nomenclature of
Medicine--Clinical Terms) (mean= 2.01 vs. mean=1.55); and UMLS (Unified Medical Language System) (mean= 1.98 vs. mean=1.86). (Table 37)

31. However, Independent-Samples t-test ($t= -2.539, df=164, p=.012<0.05$) detected a significant difference between Indian and Iranian medical librarians’ skills in ‘Standards for Medical Systems’, where Indians (mean=10.37) have a higher level of skills in standards for medical systems than Iranian (mean= 8.61) medical librarians. (Table 38) (Hypothesis 3)

**Health Informatics Products**

32. In case of skills in ‘Health Informatics products’ it was observed that Indian respondents do not possess required skills in any health informatics products listed in this study including E-Chavi (Picture Archival Communication System) (mean= 2.38); Tejas (Software Suite for Oncology) (mean= 2.14); Mercury (Telemedicine Solution) (mean= 2.07); Sanjeevani (Telemedicine Solution) (mean= 2.04); and E-Sushrut (Hospital Information Management System) (mean= 2.01). (Table 39)

**Skills in Communication and Information Infrastructure Including the Internet and Web**

33. Based on mean scores of skills in ‘Internet, Web, and Networking’ it can be concluded that Iranian respondents possess required skills in ‘Internet surfing’ (mean= 4.72), ‘Conventional search engines’(mean= 4.67), ‘Electronic bulletin boards’(mean= 3.66), ‘Email’ (mean= 4.49), ‘WWW’ (mean= 3.40), ‘Web browsers’ (mean= 3.33), and ‘TCP/IP (Transmission Control Protocol/Internet Protocol)’ (mean= 3.14). However, they do not possess appropriate skills in, ‘Markup Languages’(mean= 2.92), ‘OPAC/Web OPAC/OPAC2.0’ (mean= 2.91), ‘LAN/WAN’(mean= 2.66), ‘Voice over IP’(mean= 2.49), ‘Subject gateways’ (mean= 2.44), ‘Web page designing’ (mean= 2.43), ‘Web site administration’ (mean= 2.41), and ‘Virtual conferences or meetings’ (mean= 2.36). Further, Indian medical librarians possess required skills in ‘Email’ (mean= 3.89), ‘Conventional Search engines’ (mean= 3.88), ‘Internet surfing’
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Skills in Creating Information Access and Delivery Solutions

Provision of Access to Information through applying Information Technology

35. Concerning provision of information it can be concluded that Iranians (mean=3.83) and Indians (mean=3.45) provide their users with access to information through applying information technology. However, the comparison of mean scores showed a significant difference between Iranians and Indians (\( t = -2.483, df = 164, p = .014 < .05 \)), where Iranians provide significantly more information access through applying IT, than Indian respondents. (Table 42)

Electronic Document Delivery Systems

36. Analysis unveiled that Indian and Iranian respondents do not possess required skills in any document delivery systems listed in this study including ‘Blackwell's uncover (mean= 2.35 vs. mean= 2.33); ‘BIOSIS Document Express’ (mean= 2.33); ‘ISI Document Solution (ISIDS)’ (mean= 2.33 vs. mean= 2.43); ‘British Library Document Supply Centre (BLDSC)’ (mean= 2.33

34. Independent-Samples t-test conducted for 104 degrees of freedom at 0.05 level of significance showed a non-significant difference between Indian and Iranian medical librarians’ skills in Internet, Web and networking (\( t = -.161, df = 104, p = .872 > .05 \)). Hence, the null hypothesis is supported i.e. medical librarians in Iran (mean=47.89) and India (mean=47.57) have the same level of skills in Internet, Web and networking (Table 41). (Hypothesis 4)
vs. mean= 2.38); and ‘Chemical Abstracts Service Document Detective Service (CASDDS)’ (mean= 2.29 vs. mean= 2.26). (Table 43)

37. The independent-samples t-test at 0.05 level of significance detected a non-significant difference between Indian and Iranian medical librarians’ skills in electronic document delivery systems \( (t= -.422, df=118, p=.674>0.05) \). In other words, medical librarians in Iran (mean= 15.56) and India (mean= 15.21) have the same level of skills in electronic document delivery systems. (Table 44) (Hypothesis 5)

**Skills in DELNET**

38. Analysis demonstrated that Indian librarians (mean≤3), do not possess the required skills in DELNET document delivery system. (Table 45)

**Skills in Databases, Indexing, and Information Analysis and Synthesis to Improve Information Retrieval and Use in the Organization**

**Skills in Databases**

39. Mean scores of skills in ‘Databases’ show that Indian and Iranian respondents do not possess appropriate level of skills in any database skills listed in this study including ‘Install Databases’ (mean= 2.74 vs. mean= 2.23), ‘Maintain Databases’ (mean= 2.70 vs. mean= 2.33) ‘Database Management Systems’ such as MySQL, ORACLE and the like (mean= 2.59 vs. mean= 1.98); and ‘Administer Databases’ (mean= 2.54 vs. mean= 2.32). (Table 46)

40. However, according to the calculated mean scores, medical librarians’ level of skills in ‘Databases’ differ significantly in India (mean= 10.50) and Iran (mean= 8.66) \( (t=2.711; df= 151; p=.007<0.05) \), where Indian medical librarians have significantly higher level of skills in databases than their Iranian counterparts. (Table 47)
Skills in Database Searching Strategies and Techniques

41. It was found that, in case of skills in ‘Database Searching Strategies and Techniques’ Iranian respondents possess required skills in all search techniques listed in this study including ‘Citation searching’ (mean= 3.81), ‘Controlled vocabulary searching’ (mean= 3.78), ‘Logical, Boolean combination of terms’ (mean= 3.69), ‘Truncation of terms’ (mean= 3.63), ‘Keyword, uncontrolled vocabulary searching’ (mean= 3.61), ‘Searching classified arrays’ (mean= 3.55), ‘Pre-coordinated vocabulary searching’ (mean= 3.43), ‘Post-coordinated vocabulary searching’ (mean= 3.41), and ‘Weighting of terms’ (mean= 3.33). Further, Indian medical librarians possess required skills in ‘Logical, Boolean combination of terms’ (mean= 3.05), and ‘Keyword, uncontrolled vocabulary searching’ (mean= 3.04). But, they do not possess the required skills in ‘Controlled vocabulary searching’ (mean= 2.97), ‘Citation searching’ (mean= 2.93), ‘Pre-coordinated vocabulary searching’ (mean= 2.85), ‘Post-coordinated vocabulary searching’ (mean= 2.81), ‘Truncation of terms’ (mean= 2.77), ‘Searching classified arrays’, (mean= 2.73), and ‘Weighting of terms’ (mean= 2.54). (Table 48)

42. Medical librarians’ level of skills in ‘Database Searching Strategies and Techniques’ differ significantly in India (mean= 25.72) and Iran (mean=32.27) (t=-4.347 df= 164; p=.000<0.05), where Iranian medical librarians have significantly higher level of skills in ‘Database Searching Strategies and Techniques’ than their Indian counterparts. (Table 49)

Skills in Medical and Allied Health Databases

43. In case of skills in ‘Medical and Allied Health Databases’, It was observed that Iranian respondents own required skills in ‘PubMed/MEDLINE’ (mean= 4.16) and ‘Excerpta Medica Database (EMBASE)’ (mean= 3.01). However, they lack required skills in other databases listed in this study including ‘Cochrane Library’ (mean= 2.86), ‘Chemical Abstracts’ (mean= 2.72), ‘International Pharmaceutical Abstracts’ (mean= 2.69), ‘AIDSinfo’ (mean= 2.64), and
‘Toxicology Literature Online (Toxline)’ (mean= 2.63). Further, Indian medical librarians possess required skills in ‘PubMed/MEDLINE’ (mean= 3.24). But, they lack the required skills in other databases listed in this study including ‘Chemical Abstracts’ (mean= 2.82), ‘Toxicology Literature Online (Toxline)’ (mean= 2.79), ‘Cochrane Library’ (mean= 2.77), ‘International Pharmaceutical Abstracts’ (mean= 2.76), ‘Excerpta Medica Database (EMBASE)’ (mean= 2.73), and ‘AIDSinfo’ (mean= 2.71). (Table 50)

44. It was observed that medical librarians’ level of skills in ‘Medical and Allied Health Databases’ do not differ in India (mean= 19.79) and Iran (mean= 20.73) (t=-.889; df= 115; p=.376>.05). (Table 51)

45. Regarding skills in national medical databases, data analysis exhibited that, Indian librarians (mean= 2.87) do not possess the required skill in IndMed database. (Table 52)

46. As far as skills in Iranian national-based medical databases is concerned, Iranian librarians own the required skills in Pars Medline (mean= 3.16) and Iran Medex (mean= 3.92). (Table 53)

Skills in Data Warehousing & Data Mining

47. Data analysis unveiled that neither Indians (mean= 2.47) nor Iranians (mean=1.80) own appropriate level of skills in information analysis techniques such as data warehousing and data mining. (Table 54)

48. A significant difference was detected regarding medical librarians’ level of skills in data warehousing and data mining in India and Iran (t= 4.278, df=164, p=.000<.05). In other words, Indian (mean= 2.47) medical librarians’ level of skills in data warehousing and data mining is significantly higher than those of Iranians (mean= 1.80). (Table 54)

Skills in Indexing

49. Indian and Iranian respondents do not possess required level of skills in any indexing skills listed in this study including ‘Keyword in context (KWIC)’
‘Keyword out of context (KWOC)’ (mean= 2.56 vs. mean= 2.72), ‘Pre-coordinated indexing (PCI)’ (mean= 2.55 vs. mean= 2.73), ‘Post-coordinated indexing (PSTCI)’ (mean= 2.51 vs. mean= 2.73), ‘Controlled vocabulary indexing (CVI)’ (mean= 2.45 vs. mean= 2.86), ‘Computer-assisted indexing (CAI)’ (mean= 2.44 vs. mean= 2.76) ‘Statistical approaches, including term frequency, co-occurrence, and distribution’ (mean= 2.42 vs. mean= 2.55), ‘Rotated and permuted Keyword Indexing (RPKI)’ (mean= 2.32 vs. mean= 2.56), and ‘Use of Weighted terms’ (mean= 2.26 vs. mean= 2.15). (Table 55)

According to the calculated mean scores, medical librarians’ level of skills in ‘Indexing’ do not differ in India (mean= 22.11) and Iran (mean= 23.73) (t= -1.099, df=109, p=.274>.05). (Table 56)

Independent-Samples t-test clearly showed that there is a significant difference between Iranians and Indians regarding skills in database searching strategies and techniques, medical and allied health databases, and indexing (t=-2.661; df= 164; p=.009<0.05). Hence, the null hypothesis is rejected. i.e. Iranian medical librarians (mean= 76.0) have significantly higher level of skills in database searching strategies and techniques, medical and allied health databases, and indexing than Indian medical librarians (mean= 67.63). (Table 57) (Hypothesis 6)

The Comparison of Information Technology Skills Possessed by Medical Librarians

Analysis indicated that, of 112 information technology skills listed in this study 32 were owned by Iranians and 20 skills were possessed by Indians. Hence, it can be concluded that medical librarians in both countries do not possess most of the skills in standards suggested by MLA and SLA. In order to compare the overall IT skills possessed by respondents in India and Iran, a $X^2$ (Chi-Square) analysis of number of skills owned by medical librarians was conducted. The Chi-Square test ($X^2$ value =2.769, $P=0.96>0.05$) shows that medical librarians in
India and Iran do not differ significantly regarding the number of information technology skills they possess. (Table 58)

**Information Technology Skills Training**

**Respondents Participation in Information Technology Training**

53. Analysis showed that 73 (74.5%) out of 98 Indian respondents received IT training, and of 64 respondents to this question from Iran, majority (41; 64.1%) received training on information technology. Further, more than one-fourth (25; 25.5%) of Indians and more than one-third (35.9%) of Iranians did not receive IT training. (Figure 12)

54. Majority of Indians (48; 65.8%) and Iranian (26; 63.4%) respondents participated in IT training programmes for one month or less, the table also shows that nearly one-fourth (18; 24.7%) of Indians participated in training programmes of duration of 2 to 4 months, whereas only 6 (14.6%) of their Iranian counterparts took part in training programmes of the same duration. Analysis revealed that, only few (5; 6.8%) Indians were trained in IT for 5 to 7 months, whereas nearly one-fifth (7; 17.1%) of Iranians were trained for the same length of time. The table exhibits that very few Indians and Iranians took part in training programmes for 8 to 10 months, scoring 1.4% and 4.6%, respectively. (Table 59)

**Confidence in Receiving Enough Information Technology Training**

55. Analysis demonstrated that majority (21; 78.8%) of Indians who received IT training were 41%-60% confident that the training was sufficient for their current work, whereas, less than one-fourth (10; 24.4%) of Iranians were from 41% to 60% sure about the sufficiency of training they received. The table also shows that nearly one-third (23; 31.5%) of respondents in India were from 21% to 40% confident, and nearly one-fourth (18; 24.7%) were 61%-80% confident that received enough training. The analysis revealed that no respondent in India was more than 81% sure that the training was sufficient for their current job. Furthermore, the table reveals that nearly one-third (12; 29.3%) of Indians were
20% or less sure, more than one-fourth (11; 26.8%) were from 21% to 40% confident, and few were from 61% to 80% and 81% to 100% confident, representing 12.2% and 7.3% respectively. (Table 60)

**Preference for Training Agencies**

56. More than one-fifth (96; 22.5%) of respondents preferred ‘Library Departments’ as information technology training-providers. It is followed by ‘Medical Library Associations’ (90; 21.0%), ‘The Library professional staff’ (82; 19.1%), ‘Private sector’ (81; 18.9%), and ‘Computer center at mother organization’ (80; 18.6%). (Figure 13)

57. Data analysis illustrates that Indian respondents’ preference for IT skills training agencies, are as follows: ‘Library departments’ (63; 23.2%), ‘Medical Library Association’ (58; 21.4%), ‘Library professional staff’ (51; 18.8%), ‘Computer center at mother organizations’ (51; 18.8%), and ‘Private sector’ (48; 17.7%). Furthermore, Iranian respondents ranked their preference for the IT training-provider agencies in the following order: ‘Library departments’ (33; 20.9%), ‘Medical Library Association’ (33; 20.9%), ‘Library professional staff’ (32; 20.3%), ‘Computer center at mother organizations’ (31; 19.6%), and ‘Private sector’ (29; 18.4%). (Table 61)

**Preference for Mode of Information Technology Skills Training**

58. Analysis indicates that ‘Workshop/Seminar’ is the first preferred mode of training by 131 respondents comprising 20.8% of the total respondents. ‘IT program’ is the distant second with 110 (17.4%) respondents, followed by ‘Formal education’ (97; 15.4%), ‘Training at workplace’ (97; 15.4%), ‘Self-study’ (66; 10.5%), Colleague/Friends’ (58; 9.2%), Vendors/Suppliers (37; 5.9%), and ‘Informal education’ (35; 5.5%). (Figure 14)

59. The preferred modes of training by the respondents in India are as follows: ‘Workshop/Seminar’ (85; 20.5%), ‘Attending IT programs’ (69; 16.6%), followed by ‘Training at workplace’ (66; 15.9%), ‘Formal education’ (53; 12.8%), ‘Self-study’ (39; 9.4%), Colleague/Friends’ (39; 9.4%), ‘Informal
education’ (35; 8.4%), and Vendors/Suppliers (29; 7.0%). Iranian respondents ranked the preferred modes of training as follows: ‘Workshop/Seminar’ (46; 19.4%), ‘Formal education’ (44; 18.6%), ‘Attending IT programs’ (41; 17.3%), followed by Training at workplace’ (31; 13.1%), ‘Self-study’ (27; 11.4%), ‘Informal education’ (21; 8.9%), Colleague/Friends’ (19; 8.0%), and Vendors/Suppliers (8; 3.4%). (Table 62)

Problems that Impede Information Technology Skills Training

60. Indian respondents have rated the problems of acquiring IT skills as follows: ‘Higher authority is not interested to send their library professionals’ (93; 29.1%), ‘Lack of sufficient staff in the library’ (51; 15.9%), ‘Lack of trainers in the organisation’ (47; 14.7%), ‘Lack of financial support’ (42; 13.1), ‘Overload of working hours’ (39; 12.2%), ‘Library staff not interested’ (25; 7.8%), and ‘Lack of written CPD policies’ (23; 7.2%). Iranian respondents have rated the problems of IT skills training as follows: ‘Higher authority is not interested to send their library professionals’ (64; 25.8%), ‘Lack of written CPD policies’ (55; 22.2%), 'Lack of trainers in the organisation’ (39; 15.7%), ‘Lack of financial support’ (31; 12.5), Lack of sufficient staff in the library’ (22; 8.9%), ‘Overload of working hours’ (19; 7.7%), and ‘Library staff not interested’ (18; 7.3%). (Table 63)

7.4 Suggestions

Based on these findings and feedbacks from medical librarians the researcher makes the following recommendations:

- Medical library managements need to give priority to staff training;
- Written training policies should be available for medical libraries in both countries to create some consistency in staff training and human resources development;
- Medical libraries in both countries should periodically conduct workshops and orientations for their staff on the new development in information technology;
In order to meet medical libraries' needs of qualified and well-trained library staff, the library director and decision makers should inform library staff about all available training programs, workshops, and conferences and encourage them to attend;

Training needs assessment should be conducted periodically in order to meet the library goal and objectives regarding providing good services with highly trained staff;

New posts such as Internet coordinator and web master will need to be created for producing and managing electronic information content;

On-site training facilities and self-learning packages are required to deal with the need for continuous upgrading of skills.

7.5 Suggestions for Future Studies

- A comprehensive study of competencies needed in various types of libraries;
- A complete revision of LIS curricula in the light of competency study;
- The comparison could be done with medical librarians in other technologically advanced countries;
- An extensive study of changes that are taking place in LIS profession in developed and developing countries.

7.6 Conclusion

The present study has thrown light on information technology skills, recommended by LIS professional bodies, among medical librarians in India and Iran.

It was found that majority of respondents were heavy users of ICT who used Information technology applications on a daily basis. However, more Indian respondents regularly used information technology applications than Iranians, whereas more of the latter had access to those applications compared to Indian respondents.
As it was expected, due to the rapid spread of automation in libraries both Iranians and Indians indicated to be conversant with integrated library management systems. Yet, Iranians showed higher levels of skills in databases of bibliographic descriptions for cooperative cataloging, and different technologies for providing reference services. It is also important that librarians be skilled in database searching, development and indexing of databases as well as instructing patrons how to efficiently search through and locate needed materials. However, results indicated that librarians do not possess skills in creation and maintenance of databases and information analysis to improve information retrieval and use. Further Iranians showed to be skillful in searching strategies of databases, whereas Indians had expertise just in few searching strategies. Moreover, Iranians indicated to have expertise in national medical databases, while Indians indicated not to have such skills.

Most data analysis revealed that Iranian LIS professionals’ level of skills was higher in data structure, data content, and data value standards. Nevertheless, they lacked adequate skills in standards that support the searching and retrieval of information across networks, and standard metadata schema for describing electronic records, documents and web resources. Further, respondents in India indicated to own appropriate level of skills just in data content standards.

It was observed that although, LIS professionals in both countries indicated having skills in acquisition, use, and evaluation of information technologies, they lacked appropriate skills in methodological approaches to study online systems and users of these systems, and usage analysis.

The study shows that respondents have skills in federated search engines, but do not possess skills in meta-search engines, which they need to understand how to utilize in the search for desired materials in deep Web. Since respondents lacked skills in webpage design, it is inevitable to find that most of the librarians also lacked skills in content development tools. Given LIS professionals’ expertise in knowledge organization, information professionals are expected to make a serious contribution to the practice of knowledge management, however the study indicates that no respondents possessed adequate skills in web-based knowledge management tools. It was found that respondents
lacked required skills in technologies like RFID which is used to enhance automation, improve tracking and tracing, and prevent the loss of materials under any circumstances.

The increasing proliferation of digital information necessitates librarians’ expertise in preserving digital material to ensure continued access to digital information. However, results divulged that none of the respondents indicated to be skillful enough in digital archiving and preservation.

It was revealed that medical librarians do not possess most of IT skills recommended by professional bodies. Lack of higher authorities’ interest in sending their library professionals, lack of sufficient staff in the library, and Lack of written CPD (Continuing Professional Development) policies were considered as the most important hindrances in acquiring IT skills by Iranian and Indian LIS professionals. Workshop/seminar’, attending IT programs and formal education were the most popular mode among Indians and Iranians as medium of learning and updating their knowledge and skills of IT.

Developing information technology training programs based on regular need assessment studies enhances LIS professionals IT Skills. Medical library administrative and professional bodies in both countries should seek to develop written CPD for information technology skills. Finally, developing interactive software packages, online training programmes, publishing manuals and introducing useful Web sites for obtaining IT skills is recommended.