

Current status of using Information & Communication Technologies (ICT) and perceptions on future developments towards scholarly communication process of medical academics in Sri Lankan universities

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Abstract

The study was conducted to investigate the current status of using ICT and perceptions on future developments towards scholarly communication process of medical academics in Sri Lankan universities. This is accumulated with data from questionnaires supplemented by interviews with 125 medical academics in five universities. Results indicated that medical academics use World Wide Web (WWW) and e-mail most frequently for their scholarly activities and the highest percentage has given their first preference to WWW. All of them regularly use word-processing and presentation packages. Although medical academics identified ICT as a stylish facilitator of their work, it did not seem that they made optimal utilization of these technologies. Reasons found for this situation are lack of infrastructure

facilities, technical knowledge & skills, and helping staff etc. Recommendations are made to improve infrastructure facilities at the university level and to employ university librarians to some extent as IT helping staff for an enhanced utilization of facilities and finally take steps towards an e-world.

Keywords: *ICT, scholarly communication process, university academics, medical academics*

Introduction

Information & Communications Technology is a term that covers all forms of computer and communications equipment and software used to create, store, transmit, interpret, and manipulate information in its various formats. According to Laurillard (2002) these technologies can be divided as;

- Capturing technologies, with input devices that collect and convert information into digital form.e.g. keyboards, barcode readers etc.
- Storage technologies, producing a variety of devices to store and retrieve information in digital form. e.g. hard disks, floppy disks
- Processing technologies, creating the system and applications software that is required for the performance of digital ICT. e.g. Microsoft Office
- Communication technologies, producing the devices, methods and networks to transmit information in digital form. They include digital broadcasting, integrated services digital networks, digital cellular networks, Local Area Networks (LANs), Wide Area Networks (WANs, such as Internet),

- Electronic Bulletin Board Systems (BBS), modems, transmission media such as fiber optics, cellular phones, fax machines and digital transmission technologies for mobile space communications (the new low Earth Orbit satellite voice and data services).
- Display technologies, which create a variety of output devices for the display of digitized information. e.g. monitors, CD-ROM drives

ICT helps unlock stores of national content, making them accessible to global, and it is a powerful tool for directing and expressing creativity. Investing in ICT can have a powerful effect on productivity in almost every institute, driving innovation, cutting costs, and opening up new opportunities. ICT help to overcome limitations of size, and enable even tiny institute to establish a global presence as well as ICT can manage resources better.

Creation, organization and dissemination of information is a fundamental aspect of an academic career. Teaching and learning is a core mission of the university academic community. Lecturing, presentations, evaluation of student performances and presence in conferences are major activities relating to teaching. Research is the key component of the university academics. Research is essentially a cerebral and a social activity. Research related scholarly activities they engaged are, publishing, and peer reviewing, and obtaining grants, participating in workshops / meetings / conferences / professional forums and providing consultations on the area of specialization.

Scholarly communication process is a technique used for sharing and exchange new knowledge among academics and researchers. For the study, scholarly communication is defined as the process

of creating, organizing, evaluating, editing or formatting, distributing, making accessible, archiving, using and transforming information or scholarly works through formal and informal channels locally and globally. As scholarly communication process becomes more and more multipart, a hidden powerful inspiration that changed working and collaborative patterns of academics came in to battle. That is Information and Communication Technologies (ICT).

The information access through digital technologies can promote innovation, increase productivity, and enrich the quality of academics. There is an international consensus on the importance of intellectual input in creating value, underlining the need for investment in education and skills in general, with a special focus on ICT skills and research and development. ICT has changed the face of modern science and technology research, requiring research organizations to be linked to each other through an Advanced Network that is connected to the rest of the world. Ready access to a safe, secure, and affordable communications infrastructure that enables national and international collaboration is the other half of the equation to take us forward to the Knowledge Society:

$$I + C = KS$$

(I-Information, C-Communication, KS-Knowledge Society)

Thus, the scholarly communication process and the ICT have recognized as essential and active tools of the virtual global knowledge society.

Information and Communication Technologies (ICT) serve as the tool that fosters the knowledge society. ICT provide new and faster ways of delivering and accessing information, innovative ways of real time communication and so on. Rapid growth as well as the diffusion of ICT have a strong effect on many aspects of modern scholarly communication process and have begun to evolve a virtual global knowledge society.

The emergence of globalization of academic institutions will make the traditional Sri Lankan university boundaries obsolete. But Sri Lankan universities have a long way to go if they want to upgrade their facilities so as to assure the optimum utilization of new modes of research, teaching, learning and dissemination of knowledge through ICT.

In universities the traditional activities were being altered in modern sophisticated manner through ICT. Thus, ICT were called to attention or referred to as a major force used in Sri Lankan universities these days (Michelsen, 2005). Although ICT so far had limited impact on how the university is organized and how learning, teaching and research were conducted, a series of factors had nevertheless pointed in the direction of development where the new technologies would become more important.

Medical academic community in universities contributes for the scholarly communication process in various capacities, facilitating multidisciplinary collaboration of educational research projects and innovative scientific developments. To keep up with the scientific revolution, medical academics need; timely and reliable exchange of experimental information, access to relevant advances in knowledge, raising awareness, advocacy for progressive policies,

access to disciplinary specific data, and training and research and the local as well as international collaboration.

The current trend of the Sri Lankan university medical academic community is to adopt ICT in a high level to save their time for the convenience of their scholarly works. But, the medical academic community is being gradually left behind, in this case, with their busy life with their clinical works too.

Although there is wide range of sophisticated facilities with ICT, Sri Lankan academics use only some of them. For this particular study, computing technologies, processing technologies, communication technologies, telecommunication and the Internet represent as ICT used to communicate, process, create, disseminate, share, store and manage information.

Most of the academics in Sri Lankan universities mostly use common computer packages/ programs for their scholarly activities such as creation, processing, store, data analysis and lecture delivering. Some of them, which were selected to this study, are Word processing packages, Spreadsheet programs, Presentation packages, Page making packages, Statistical packages, Graphic designing packages, E-mail (Electronic mail), WWW (World Wide Web), EDGs (Electronic Discussion Groups), BBS (Bulletin Board System), Telnet, and Video conferencing. Further they can capture the advantage of Web 2.0 tools for their scholarly activities. "Web 2.0" refers to a perceived second generation of web development and design, that facilitates communication, secure information sharing, interoperability, and collaboration on the World Wide Web. Web 2.0 concepts have led to the development and evolution of web-based communities, hosted services, and applications such

as social-networking sites, video-sharing sites, wikis, blogs, and folksonomies. The popularity of the term Web 2.0, along with the increasing use of blogs, wikis, and social networking technologies, has led many in academia to coin a flurry of 2.0s, including Library 2.0, Social Work 2.0, Enterprise 2.0, PR 2.0, Classroom 2.0, Publishing 2.0, Medicine 2.0, and Government 2.0. Many of these 2.0s refer to Web 2.0 technologies as the source of the new version in their respective disciplines and areas.

The growing use of these ICT in scholarly communication process of university academics having a fundamental impact on the way they engage in their scholarly works. Therefore, this study in the field of Medical Science in Sri Lanka enlightens other fields and the countries in adopting as well as using ICT for their scholarly communication process.

Objectives of the study

The main objective of the study is to evaluate the current status and future trend of ICT utilization in scholarly communication process of medical academics in the universities of Sri Lanka

Specific objectives derived for the study can be given as follows;

- To determine the mostly used ICT by medical academics in their scholarly communication process.
- To ascertain the current status of the use of ICT and the perceptions on future development of ICT regarding the scholarly communication process of medical academics.

Research design

Survey method was used to conduct this research. The teaching community in the field of Medical Sciences was the 'population' for this particular study. The common characteristic of the elements was 'members of the Faculty of Medicine'. 'Stratified random sample' was used in sampling, in order to present all the categories of the population. 'University' and the 'lecturer category' were identified as the criteria for the stratification. The sample was selected to represent each strata proportionately. 25% of each strata was taken into account. The main instrument of the data collection was the questionnaire. Because of the complexity of the questions, questionnaires were supplemented by interviews. Therefore, the researcher visited all the selected universities (except Jaffna) to fill the questionnaires by interview mode. However, some of the respondents completed the questionnaires themselves. Researcher visited the universities during September-November 2005 and 100% response rate was achieved in this manner.

Questionnaires were sent to the Jaffna University in September 2005 by post. However, none of the questionnaires were returned. Due to prevailing situation in the country, it was not possible to visit the Jaffna University. Hence the University of Jaffna was dropped from the analysis of the study.

Analysis of mostly use ICT and current status of using ICT

Sample Description

Out of 131 expected questionnaires, 125 were completed at a rate of 95.42%. Except the University of Jaffna, the response rate was 100%. Therefore, the overall response rate is satisfactory.

A large percentage (25.6%) of respondents were from the University of Colombo, because of it represented the largest group of the population too. Majority of the respondents are senior lecturers. But the gender distribution is not much varied over the respondents. It categorizes as 51.2% males and 48.8% females. The most of the respondents were from the age groups 31-40 (40.8%) years and 41-50 (34.4%) years. Ages above 60 years and within 21-30 years were only small percentages 5.6% and 4.8% respectively. Only a 21.6% respondents are from Clinical departments (Clinical Medicine, Obstetrics & Gynecology, Pediatrics, Psychiatry, surgery and Anesthesiology) and the majority of respondents (78.4%) are from other clinical support departments (Anatomy, Biochemistry, Community & Family Medicine, Forensic Medicine, Microbiology, Parasitology, Pathology, Pharmacology, Physiology and Medical Education).

The respondents were asked the frequency of using a computer on average day for their academic activities. 92.8% (116) of respondents used a computer on average daily basis. 5.6% (7) used it on average weekly basis for their academic purposes. The two remaining respondents out of 125 were not using a computer. One of them is a female senior lecturer from a clinical support department with a service of nine years in the University of Peradeniya. She preferred not to have anything to do with computers and she did not use e-mail. However, the assistants have done some documentation with a computer occasionally instead of her. The other one is a senior professor of the University

of Sri J'Pura. He does not use a computer by himself. But, the assistants have done the computer activities for him. Therefore, he fulfilled some of scholarly activities such as preparing lecture notes, presentations and documentation through computers. Majority of the respondents, 64.8% used a computer with Internet access at both university and home. 16% of respondents used it only at their universities. The majority (55.2%) of respondents used their personal e-mail address and 36.8% use the e-mail addresses both personal and given by university for their academic and personal activities.

• Analysis of ICT usage

The rank of mostly used ICT was examined separately for the electronic communication technologies and computer packages. First, respondents were asked to rank the mostly use order of electronic communication technologies. Results were as Table 1.

Table 1 Percentages according to preference order of electronic communication technologies

Choice	1st	2nd	3rd	4th	Total
Electronic communication technology					
Electronic mail	33 (27.50)	85 (69.17)	3 (2.50)	1 (0.83)	N=120
World Wide Web	90 (74.38)	31 (25.62)			N=121
Electronic Discussion Groups	1 (4.17)	5 (12.50)	15 (62.50)	5 (20.83)	N=24
Bulletin Board Systems		1 (11.11)	8 (88.89)		N=9

Table 1 shows that a majority of the respondents used WWW and e-mail. Only 24 respondents used EDGs and nine used BBSs. As

highlighted in the table, the largest number of respondents 90 (74.38%) have given their first choice for the WWW. Thus, the mostly used electronic communication technology is WWW. Respondents accessed online journals, other medical free resources and websites through WWW. The next largest number of respondents, 83 (69.17%) have offered their second choice for e-mail. Only 33 (27.50%) have given their first choice for e-mails.

Friedman test was employed to see the difference between choices of using above-discussed electronic communication technologies under an adjustment. Since all the respondents have not used the desired entire electronic communication technologies, the least rank was replaced as the missing values in order to have similar number of responses. The testing hypothesis was:

H_0 : there is no difference among ranks versus H_1 : there is any difference among ranks

Table 2 Friedman test results for the significance of using order of electronic communication technologies

Friedman Test Results

$\chi^2 = 283.51$ DF = 3 P = 0.000
 $\chi^2 = 313.27$ DF = 3 P = 0.000
 (adjusted for ties)

Treatment	N	Est Median	Sum of Ranks
E-mail	120	2.000	213.5
WWW	120	1.000	152.5
EDG	120	4.000	410.5
BBS	120	4.000	413.5

Grand median = 2.750

The p-value for the test was very small (0.000) and it was less than 0.05. Therefore, the H_0 of the hypothesis was rejected. It implies the existence of significance treatment effect. Estimated medians revealed that the difference exists between the choices for e-mail use and the WWW use. Table 2 further confirms that the largest number of respondents mostly use WWW other than other electronic communication technologies.

Table 3 Percentages according to using order of computer packages

Choice Computer packages	1st	2nd	3rd	4th	5th	6th	Total
Word Processing packages	63 (52.07)	57 (47.11)	1 (0.83)	-	-	-	N=121
Presentation packages	76 (62.30)	46 (37.70)	-	-	-	-	N=122
Spreadsheets	1 (1.10)	11 (12.09)	67 (73.63)	11 (12.09)	1 (1.10)	-	N=61
Page making packages	-	2 (21.08)	5 (38.46)	4 (30.77)	1 (7.69)	-	N=13
Statistical packages	-	4 (5.88)	21 (30.83)	34 (50.00)	9 (13.24)	-	N=68
Graphic design packages	-	3 (15.79)	8 (42.11)	5 (26.32)	2 (10.53)	1 (5.26)	N=19

Table3 highlights that the majority of respondents mostly used word-processing packages and presentation packages. Ninety-one used spreadsheets, 68 used statistical packages, 19 used graphic design packages and 13 used page-making packages. There were only two respondents who used the all computer packages mentioned.

According to table 3, the largest number of respondents 76 (62.30%) have given their first choice for the presentation packages. With the emergence of novel technologies, academics Figure shows

mostly use the presentation packages with multimedia projectors in delivering lectures as well as for teaching. In addition, when it was required to provide lecture notes for the students, they used the presentation package to prepare it and for making the handout. Therefore, their usage of presentation packages has become very high. Because of those reasons, the majority's first choice goes for the presentation packages.

Table 3 further shows that 63 (52.07%) out of 121, have offered their first choice for word-processing packages. Most of the time respondents use it for preparing articles/ abstracts and any other documents. Sixty-seven (73.63%) out of 91, thirdly used spreadsheets for their scholarly activities.

Data were statistically analyzed to test the hypothesis;

H_0 : there is no difference among ranks H_1 : there is any difference among ranks

The results for the using order of computer packages were presented in Table 4.

Table 4 Friedman test results for the significance of order of using computer packages

Friedman Test Results				
S = 442.29 DF = 5 P = 0.000				
S = 509.05 DF = 5 P = 0.000 (adjusted for ties)				
Treatment	N	Median	Sum of Ranks	
Spreadsheets	122	3.167	445.5	
Graphic design	122	4.000	587.0	
Page making	122	4.000	589.0	
Presentation	122	1.333	178.5	
Statistical	122	3.833	569.0	
Word processing	122	1.667	193.0	
Grand median = 3.000				

According to the p-value of the Friedman test, depicted in Table 4 the null hypothesis could be rejected. It implies that there exists a significance difference of using order of computer packages. Estimated medians of the table clearly show that the differences are available among the choices of using all the other computer packages except for graphic design packages and page making packages. The rank sums of Friedman test shown in Table 4, confirms the largest number of respondents mostly use presentation packages and then word processing packages.

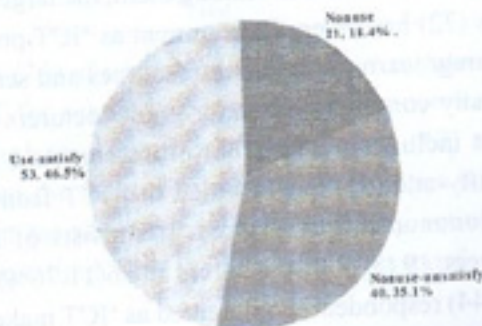
- Current status of using ICT

An open ended question was provided to respondents to make notes on their current status of using ICT for their scholarly activities. According to comments given, respondents were first categorized into three groups;

- Respondents who gave positive comments on usage of ICT
- Respondents who gave negative comments on usage of ICT
- Respondents who gave both-ideas on usage of ICT

Distribution of these three groups was depicted in Figure 1.

Current status of using ICTs for scholarly communication process



that 46.5% of respondents have given positive comments on their usage of ICT. The positive comments they have given are; ICT provides a very useful teaching/ learning/ research resources & service, ICT facilitates user's electronic communication services too, ICT makes academic work easier, effective and saves the time. Because of these reasons, they used ICT much and they were satisfactory with it.

The other fraction of the respondents were also used ICT to some extent, but they have not used as they wished and according to their requirements. However, they were not satisfied on their usage. Out of them, 35.1% of respondents have given only negative comments. The negative comments they have given are; Lack of infrastructure facilities, Lack of technical knowledge, skills and ability, Lack of reliable resources, Lack of time to use, and Dislike to use. The rest of 18.4% has given both positive and negative comments, but they also have not used ICT as they wished.

The comments, which respondents have been given, were further analyzed in detail as shown in Table 5.

According to the above table 5, the majority of the respondents have given the positive comments. Among them, the largest number of respondents (72) has given the comment as 'ICT provide a very useful teaching/ learning/ research resources and services'. That number mostly comprises of senior grade lecturers 38(52.78%) and the rest includes 12(16.67%) professors and 22(30.56%) lecturers. Fifty-one (51) has affirmed that ICT facilitates user's electronic communication services. It consists of 26(50.98%) senior lecturers, 19 (37.25%) lecturers and 6(11.76%) professors. Forty-four (44) respondents commented as 'ICT makes academic

work easier, effective and saves their time'. Out of them, half were senior grade lecturers. Others were 12 (27.27%) lecturers and 10(22.73%) professors. Finally, they noted that because of those positive remarks of ICT, they used ICT mostly for their scholarly purposes as well as others and further they were satisfied on their usage.

Table 5: Frequencies of respondents who have given comments on current usage of ICT

Comments		Prof	Sen Lec	Lec	Total
Positive	ICT provides a very useful teaching/learning/ research resources & services	12 (16.67)	38 (52.78)	22 (30.56)	72 (100)
	ICT facilitates users electronic communication services	6 (11.76)	26 (50.98)	19 (37.25)	51 (100)
	ICT makes academic work easier, effective and save the time	10 (22.73)	22 (50.00)	12 (27.27)	44 (100)
Total					167
Negative	Lack of infrastructure facilities	10 (25.00)	19 (47.50)	11 (27.50)	40 (100)
	Lack of technical knowledge, skills and ability	3 (73.33)	4 (44.44)	2 (22.22)	9 (100)
	Lack of reliable resources	-	5 (50.00)	5 (50.00)	10 (100)
	Lack of time to use	3 (73.03)	8 (61.54)	2 (15.38)	13 (100)
	Not like to use	-	5 (66.67)	1 (31.32)	6 (100)
Total					78

Seventy-five (75) of respondents have given negative comments towards ICT for scholarly communication process as shown in Table 5. The largest number of respondents (40) among them remarked that the lack of infrastructure facilities has become a major reason for not using ICT for scholarly activities as they wished and required. That number comprises mostly of senior

10(25.00%) professors. Then thirteen responded, as they have no time to use ICT for scholarly purposes, ten have noted that they not inclined to use much due to lack of reliable resources and nine responded that they did not have adequate technical knowledge, skills and ability on ICT. Because of these reasons, all of them did not use much and were unsatisfied with their usage.

Three respondents including two senior lecturers and one lecturer were stated that they do not like to use ICT as highlighted in the table. Those have only given that comment, but they used ICT to some extent for their scholarly activities.

As shown in Figure 1, 21 (18.4%) respondents have produced both positive and negative comments. All of them noted that although ICT has much more benefits and good characteristics they have not been able to use them due to lack of infrastructure facilities, lack of time, lack of necessary technical knowledge and lack of necessary resources. More than half of those respondents 12 (57.14%), remarked that the unavailability of adequate infrastructure facilities as the reason for not using ICT for scholarly purposes according to their wish and necessity as well as they were unsatisfactory on the facilities available for them.

• Perceptions on future development of ICT

Respondents were asked about the perceptions on future development of ICT on scholarly communication process in their universities through an open-ended question. Only 101 were commented on future development of ICT towards scholarly purposes. The given comments were summarized as shown in Table 6.

Table 6 Frequencies of respondents who have given comments on future development of ICT

Comments	Prof	SenLec	Lec	Total
Need more infrastructure facilities with a better Internet connection	8 (17.39)	23 (50.00)	15 (32.61)	46
Should be developed as e/virtual universities and finally an e-world	6 (17.14)	20 (57.14)	9 (25.71)	35
Need to subscribe more e-resources/ services	2 (7.69)	15 (57.69)	9 (34.62)	26
Need to establish computer based teaching, exams and problem based learning through computers	3 (23.08)	6 (46.15)	4 (30.77)	13
Need to develop an inter-university network	1 (14.29)	5 (71.43)	1 (14.29)	7
Need more sophisticated equipments and s/w	1 (20.00)	1 (20.00)	3 (60.00)	5
Need much knowledge and skills on ICT	1 (20.00)	2 (40.00)	2 (40.00)	5
Need a helping staff for using ICT	1 (25.00)	3 (75.00)	.	4
Should be facilitated students	.	.	3 (100)	3

Table 6 highlights that the largest number of respondents (46) comprising of 23(50.00%) senior lecturers, 15(32.61%) lecturers and 8(17.39%) professors, noted that they need to develop infrastructure facilities. According to the interview survey, they wished to have more computers, network connections as well as reliable & continuous Internet connections for their departments. Thirty-five (35) commented that they wish major developments of ICT in their universities to if possible become e-universities/ virtual-universities and finally to an e-world. That comprised mostly of senior lecturers 20(57.14%) and then 9(25.71%) lecturers and 6(17.14%) professors.

Further, 26 academics responded that they need more e-resources such as related online journals, online databases and e-services such as telnet, Electronic Discussion Groups (EDG) as well as video conferencing/teleconferencing facilities. Most of them (18) were willing to have more e-resources. Only one junior lecturer remarked that he need telnet and EDG facilities to get easily perform his academic activities. The rest of respondents affirmed of the necessity of video conferencing/teleconferencing facilities. Most of them were from Forensic Medicine Departments. One senior lecturer from Forensic Medicine Department in the University of Ruhuna said that, *"Most of the time I have to travel long distances for postmortems. Therefore if videoconferencing facilities are available, I will be able to perform them from here and save my time"*. Others were from Anatomy Departments.

Thirteen (13) respondents emphasized on the destitute of computer based teaching learning environments and online exams and seven (7) highlighted that the necessity of an inter-university network. At the interview survey, five (5) respondents made an interesting comment. They showed the necessity of more sophisticated equipments to increase the usage of ICT in scholarly communication process. One professor noted that, *"If the department has a portable hand held multimedia projector, then I will be able to bring it to the lecture hall by myself and deliver all of my lectures as PowerPoint presentations"*. At the same time, he showed the necessity for much skills and knowledge on ICT.

Four respondents including one professor commented on the urgency essential of helping staff to help with their high usage of

ICT on scholarly activities. Lastly, three lecturers produced an idea to facilitate students with all these developments regarding ICT in the university system.

Conclusion

According to the survey medical academics mostly use WWW and e-mail most frequently for their scholarly activities. However, the highest percentage of lecturers (75%) gives their first choice to the WWW.

All the medical academics regularly use word-processing packages and presentation packages. 62% of academics give their first choice to the presentation packages and 52% for the word processing packages.

Current status and future perceptions of ICT on scholarly purposes

Nearly fifty percent of the medical academics have a positive attitude towards ICT and use ICT satisfactory. They believe that ICT provides very useful teaching/ learning/ research resources & services; ICT facilitates electronic communication of the users and help in academic work making it effective and time saving. Largest number of academics (72) commented that 'ICT provide very useful teaching/ learning/ research resources and services'.

Some medical academics do not use ICT comfortably. They are not satisfied in the way they use ICT. Reasons for low and unsatisfactory use of ICT are the lack of infrastructure facilities, inadequate technical knowledge/ skills, non-availability of reliable

resources and lack of time to use. Forty (40) lecturers affirmed that lack of infrastructure facilities had become a major reason for not using ICT for scholarly activities.

Some medical academics have positive attitude towards ICT, but they are unable to use ICT as they wish and when necessity arises since their departments lack infrastructure facilities. The situation may be due to inadequate funds and unawareness.

Medical academics wish to have more developed infrastructure facilities with improved and continuous Internet facility. In addition, they expect to have more e-resources, more sophisticated equipments, trainings and guidance in using ICT.

Recommendations

The academics find the ICT facilities provided by the universities are not up to standard. Hence, it is recommended to expand and enhance ICT facilities particularly by providing more enhanced Internet connections.

Medical professionals have realized necessity of improving their ICT skills particularly in Internet searching. It is recommend to provide them with more training facilities. University libraries are the focal points regarding this position. They can organize ICT training as part of their user education programs. Library staff is more accessible and approachable to Medical academics as well as they will become effective instructors too. Therefore library staff should be trained to take full advantage of the opportunities of ICT, need to develop the skills of workforce at every level, from front-line staff to senior staff.

Therefore, researchers can conduct studies to investigate the new steps librarians have set out within their roles towards academia in enhancing their adoption and utilization of novel technologies.

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