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Examining Digital Literacy Competencies Among the Research Scholars of Central University of Punjab, Bathinda: A Survey

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The study attempted to assess the digital literacy competences and skills of researchers in terms of several variables. The sample consisted of 96 Ph.D. research scholars working in a variety of departments of the Central University ofPunjab, Bathinda. A well- designed and developed questionnaire was utilized to gather the data. Results showed that in terms of gender variable digital literacy skills of male research scholars were found at a high. Besides, a majority of the research scholars were using digital devices daily and their preferred places for using the ICT tools were the department research labs followed by the central library. In addition, the study revealed that researchers were fairly confident in the identification of computer parts. Towards the end, the research concluded that digital tools and skills to use them were at utmost needed for the quality and quantity of any research.

Keywords: *Digital literacy, Media and Information Literacy, Computing skills, Digitaldevices, Information Communication Technology.*

0 INTRODUCTION

We are living in an information society, where everything is networked which makes it imperative that the individuals are required to be equipped with digital skills helping them to access, store, and process digital information. The importance of digital literacy has been on a phenomenal increase on a daily basis mainly due to the "technological changes and the information explosion which have altered the dimensions of learning."[1]

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At the present moment, Information Communication Technology has become totally unavoidable and has been embraced as an essential component of modern life. In fact, cultures and communities have evolved to meet the information age demands. We need to be digitally literate in order to survive in this information age. To be a digital literate, a broad spectrum of competencies and skills are required, all of which are essential to achieve a desired goal in this digital age. Apart from the learning and teaching process, digital literacy plays a critical role in conducting quality research. Research scholars are increasingly required to learn these skills for executing better research.[2]

1 BACKGROUND OF THE STUDY

Along with the other twelve central universities, the Central University of Punjab, Bathinda was established in 2009 by the Act of Parliament (No.25, of 2009). Initially the university became operational in a three-room camp office, which was offered by the State Government of Punjab, who also undertook the responsibility of searching for a suitable land for the new campus of the University. Finally, they succeeded in finding 500 acres of land in Ghudda village in Bathinda district and registered it as the final location of the new university campus. Its foundation stone was laid down on 7th September, 2015.[3]

The new campus is environment friendly and energy-efficient, meeting the GREHA-IV standard requirements. The master plan of the new campus has been certified with a five-star rating by GREHA Council and TERI. The university has 31 departments and 11 schools in Social Sciences, Technology, Education, Humanities, Sciences, and Law. [3]

The University Library has grown at a rapid and continuous rate, responding to the learning and research requirements of the university faculty and students. The library, thoughtfully constructed with well-designed furniture, has more than 49852 titles and subscribed to 38 print journals. The University library has subscribed to a significant number of e-journals through e-ShodhSindhu. The library has self-sufficiently subscribed to the American Chemical Society, American Institute of Physics, American Physical Society, Annual Reviews, Economic & Political Weekly, JSTOR, Oxford University Press, Nature, Project Muse, Springer Link, Taylor & Francis, Wiley-Blackwell, Sage and has access to significant databases, including Indiastat.com, ISID, CAPITALINE, SCOPUS, EPWRF India Time series, Indiastat.com, Web of Science, MathSciNet, ProwessIQ Database, States of India Database, SciFinder. The University library is completely air-conditioned and is Wi-Fi equipped, facilitating students to work inside the library while exploring online and offline materials. The library is equipped with RFID, Electro-Magnetic Security System, which provides patrons with automated self-service and high-level security. It also has Web OPAC powered by SLMIS 21. [3]

2 OBJECTIVES

The study has the following objectives:

- To assess PhD research scholars' competences in terms of computer proficiency in finding and presenting information using digital devices.
- To investigate the purpose and frequency of using ICT tools by the researchers.
- To gauge the scholars' awareness regarding the facilities available in the university.
- To understand the familiarity and usefulness of various ICT tools.
- To find the opinions of research scholars regarding the use of ICT tools.
- To identify ICT tools used by the PhD scholars for their research purposes.

3 LITERATURE REVIEW

Singh, Chander & Singh[4] assessed "the digital literacy of Ph.D. research scholars who were operating in various departments of Lovely Professional University (LPU), Phagwara." Along with personal lives of the researchers, the study examined the impact of ICT tools on research works. The purpose and extent of using ICT tools had been discussed in detail. The researchers attempted to ascertain the satisfaction level of the researchers in terms of digital devices available in the departmental labs/libraries.

Bansode & Viswe[5] explored the "ICT literacy of the library professionals working in university libraries in Maharashtra. The study reported that the respondents' level regarding digital literacy is quite satisfactory. Towards the end, the researchers suggested that university libraries must organise training and orientation programs to enhance ICT literacy level of library professionals."

Cam & Kiyici[1] explored the ICT skills of "prospective teachers studying in different departments of Sakarya University College of Education." The results of the study brought out the fact that male prospective teachers were more aware than the female prospective teachers. The study also discovered that digital skills of prospective teachers from computer education department were high as compared to other departments.

Yazon, *et al*[6] investigated "the relationship between digital literacy, digital competence and research productivity of educators. The results of the study revealed that there was a strong and significant relationship between faculty members' digital literacy and research productivity which presented that the increase in understanding, finding, using, and creating information using digital technologies was positively related to faculty members' ability to conduct, complete, present and publish a research article."

Lizunova, *et al* (2022) studied reading in terms of paper and screen. They examined different "scientific points on the uniqueness of reading activities in various formats, effectiveness, and perception of readers about printed and electronic texts." The study found that the reading on screen is evolving."

4 SCOPE OF THE STUDY

All critical concerns regarding digital literacy skills possessed by different research scholars in the Central University of Punjab, Bathinda have been examined and studied. The scope of the present study primarily consists of 96 Ph.D. research scholars working in diverse departments of the Central University of Punjab, Bathinda.

5 RESEARCH METHODOLOGY

A merged research methodology was adopted for this present study. The adopted methods were, therefore: Literature Search, Questionnaire and Informal Interviews

6 DATA COLLECTION

For the purposes of data collection of this study, the investigators distributed questionnaires among the Ph.D. research scholars of various departments of the University. The responses have been received personally from each research scholar and the data was collected from the researchers between April-May of 2022.

Number of questionnaires distributed	130
Number of questionnaires received	96

7 ANALYSIS AND DISCUSSION

TABLE-1

71 Gender-wise Distribution of Respondents

Gender	**No. of Respondents**	**%age**
Male	62	64.58
Female	34	35.42
Total	**96**	**100.0**

Table-1 distributes research scholars in terms of gender. As per the gender-wise distribution, among the 96 responses majority of the researchers were in male category (64.58), followed by category of female researchers (35.42%).

TABLE-2

72 Awareness of ICTs

Awareness	No. of responses	%age
Yes	91	94.79
No	5	5.21
Total	**96**	**100.0**

Table-2 shows the researchers' assessment on awareness of ICTs. As presented in the above tabulation, respondents are quite aware of ICTs (94.79%), while a few research scholars are not much aware (5.21%).

TABLE-3

73 Purpose of Using Digital Devices

Purpose	No. of Researchers	%age
Internet searching	92	95.83
Online shopping	81	84.37
Making presentations	78	81.25
Updating knowledge	84	87.5
E-payment	86	89.58
Online reading	92	95.83
Writing papers	86	89.58
Edutainment	51	53.12
Career development	66	68.75

Table-3 represents the researchers' assessment on the purpose of using digital devices. As presented in Table-3, a majority of the researchers (95.83%) use ICT tools for browsing the internet and online reading (95.83%), followed by 89.58% researchers who make use of them for writing research papers and for making e-payment. Moreover 87.5% researchers keep themselves updated by using ICT tools, 84.37% scholars use them for online shopping through e-commerce sites, such as, Flipkart and Amazon, 81.25% researchers' purpose of using computers is for making presentations whereas 68.75% researchers use ICT tools for career development opportunities, and 53.12% researchers use them for online edutainment programs.

TABLE-4

74 Types of ICT Tools Used

Type	No. of Researchers	%age
Laptop	93	96.87
Kindle	21	21.87
Smart Phone	96	100.0
I-Pad	13	13.54
Desktop	72	75.0
Notebook	33	34.38
Digital Camera	42	43.75
I-Pod	8	8.33
Pen Drive(USB)	84	87.5
Action Camera (Go-Pro, Dji)	10	10.42
Unmanned aerial vehicle(Drone)	5	5.21
Bluetooth Headphone	78	81.25
Instant Photo Printer	11	11.46
Smart Speaker (Google 5, Amazon Echo)	27	28.12

Table-4 elucidates that every research scholar uses smart phone, followed by 96.87% of scholars who use laptops. 87.5% researchers use pen drive while Bluetooth headphones are being used by 81.25% and 75% of research scholars use desktop computers for their research purposes. The digital camera is being used by 43.75% of the researchers, followed by 34.38% who use notebooks for their study purposes. And 28.12% use smart speakers such as Amazon Echo to listen to podcasts and for edutainment. The 21.87% PhD research scholars use kindle to read novels during their spare time. I-Pad is being used by 13.54% researchers, Instant photo printer by 11.46%, while 10.42% researchers use Action Camera followed by 8.33% researchers who use I-Pod, and Drone is by 5.21%.

TABLE-5

75 Types of ICT Tools Owned

Type	No. of Researchers	%age
Laptop	94	97.92
Kindle	12	12.5
Smart Phone	96	100.0
I-Pad	10	10.42
Desktop	43	44.79
Notebook	17	17.71
Digital Camera	21	21.88
I-Pod	6	6.25
Pen Drive(USB)	73	76.04
Action Camera (Go-Pro, Dji)	6	6.25
Unmanned aerial vehicle (Drone)	2	2.08
Bluetooth Headphone	61	63.54
Instant Photo Printer	9	9.37
Smart Speaker (Google5, Amazon Echo)	21	21.88

Table-5 depicts the various ICT tools owned by the research scholars. It shows that every respondent owns a smart phone. The 97.92% researchers have their laptops assisting in their research, while 76.04% use pen drive, and 63.54% researchers have Bluetooth headphones, followed by the 44.79% users who own desktops, 21.88% researchers have digital cameras & smart speaker, 17.71% have their own notebooks. The lease owned ICT devices are kindle that is 12.5%, I-Pad by 10.42%, I-Pod (6.25%), action camera (6.25%), and Drone (2.1%).

TABLE-6

76 Frequency of Using Digital Devices

Frequency	No. of Responses	%age
Hourly	32	33.34
Daily	62	64.58
Once a week	1	1.04
Twice a week	0	0.0
Once in fortnightly	0	0.0
Once a month	1	1.04
Occasionally	0	0.0
Total	**96**	**100**

Table 6 shows that of most of the respondents (64.58%) use digital devices daily. 33.34% research scholars use the digital devices hourly while 1.04% use them once a week and once in a month. There are no such users who use digital devices in twice a week and once in fortnightly.

TABLE-7

77 Places Where Digital Devices were Used

Place	No. of Researchers	%age
Library	28	29.16
Department	34	35.42
Computer Lab	11	11.46
Cybercafé	1	1.04
Home/hostel room	22	22.92
Total	**96**	**100**

Data in Table-7 reveals the preferred places of using digital devices. 35.42% research scholars prefer to use digital devices at the departments, followed by the library (29.16%). 22.92% researchers use the ICT tools at their homes/ hostel rooms. The 11.46% researchers prefer to go to the computer lab while the least preferable place is the cyber cafe that is 1.04%.

TABLE-8

78 Satisfaction Regarding Digital Devices Available in the Department Research Labs

Satisfaction Level	No. of Researchers	%age
Fully satisfied	23	23.96
Partially satisfied	60	62.50
Dissatisfied	13	13.54
Total	**96**	**100**

The above tabulation highlights the satisfaction level of the research scholars with ICT facilities at their department research labs. It has been seen that a majority of the researchers (62.50%) are partially satisfied with the departmental ICT facilities, and 23.96% of the research scholars are fully satisfied. There are 13.54% scholars who are dissatisfied with the ICT facilities being provided by the department research labs.

TABLE-9

79 Familiarity with Web-based Resources/Services

Web Resource/Service	No. of Researchers	%age
Search Engines	94	97.92
Web Portals	85	88.54
Digital Libraries/Archives	79	82.3
Institutional Repositories	51	53.12
Web directories	40	41.67
Subject Gateways	30	31.25
Web Browsers	81	84.37
E-Journals/E-Magazines/ E-Books/E-Newspaper	82	85.42
Online Databases	82	85.42
E-mail alert services	72	75.0
ETDs	71	73.96

Table-9 indicates the extent to which research scholars are acquainted with various Internet resources and services. A majority of the respondents (97.92%) are familiar with Search engines and use them, followed by web portals (88.54%) users. The users of e-journals, e-magazines, e-books and e-newspaper and online databases are 85.42%. The number of researchers who are familiar with web browsers are 84.37% while users of digital libraries/ archives are of 82.3%, and E-mail alert services are being used by 75.0%. The 73.9% scholars are aware of e-thesis/ dissertation (ETD) databases, and 53.1%

researchers are familiar with institutional repositories. The least familiar are those who are familiar with web directories (41.67%) and subject gateways (31.25%).

TABLE-10

710 Types of ICT Skills the Researchers Know About

Type	No. of Researchers	%age
Web searching	92	95.83
Multimedia	60	62.5
MSOffice/DTP tools	85	88.54
Programming Languages	16	16.67

The data indicated in Table-10 exposes that most of the researchers (95.83%) have the skills to surf and search the Web using different search strategies such as Boolean logic, followed by MS Office/DTP tools (88.54%) for presentation and thesis writing. The 62.5% have multimedia skills, while 16.67% have skills in a gamut of programming languages, such as Python, C++, Java etc.

TABLE-11

711 Use of Social Networking

Social Networking	No. of Researchers	%age
Email	96	100.0
Twitter	79	82.3
Weblogs	57	59.37
WhatsApp	95	98.96
Facebook	88	91.67
YouTube	94	97.92
Skype	69	71.88
Instagram	80	83.33

The data in Table-11 displays the research scholars' awareness and use of social networking applications. It reveals the overwhelming response in all of the categories mentioned above. Every one of the research scholars (100.0%) is familiar with the working of E-mail. The 98.96% scholars are familiar with WhatsApp, followed by YouTube (97.92%) and Facebook (91.67%). The research scholars who use Instagram are 83.33%, while the percentage of Twitter users is 82.3% followed by Skype (71.88%) and Web blogs (59.37%).

The benefits of ICTs have been illustrated in Table-12. It shows that the majority of the respondents (68.75%) strongly agree that the web resources/ services help in their research while 59.38% researchers have a strong belief that they can access real time current information and the updated information (58.33%) is available on the web. 53.13% said that information communication is very easy. 51.04% scholars strongly agree that searching and retrieval of

information is easier by using computers and the internet. The (48.96%) scholars agree that laptops are easier to carry. 46.88% respondents agree that they enjoy using computers and the internet followed by 43.75%) researchers, who agree that information search and retrieval is easy. 39.59% respondents agree that updated information is available on the web and information communication is also very easy.

TABLE-12

712 Researchers' Assessment in Terms of Merits of Using ICTs

Indicative Statement	Strongly Agree	Agree	Disagree
I enjoy using computer and web.	49 (51.04%)	45(46.88%)	2 (2.08%)
It is easy to carry laptop anywhere.	42 (43.75%)	47(48.96%)	7 (7.29%)
Updated information is available on the web.	56 (58.33%)	38(39.59%)	2 (2.08%)
Searching and retrieving information is easy in the web environment.	49 (51.04%)	42(43.75%)	5 (5.21%)
Web resources/services help in my research work.	66 (68.75%)	27(28.13%)	3 (3.12%)
I can access real time information.	57 (59.38%)	32(33.33%)	7 (7.29%)
Information communication is very easy.	51 (53.13%)	38(39.58%)	7 (7.29%)

TABLE-13

713 Researchers' Assessment in Terms of Demerits of Using ICTs

Indicative Statement	Strongly Agree	Agree	Disagree
I'm not sure about the quality of information available on the web.	26 (27.1%)	47(48.95%)	23(23.95%)
I like traditional system of learning.	15 (15.6%)	33 (34.4%)	48 (50.0%)
It is very difficult to study for long time on computer screen.	45 (46.9%)	41 (42.7%)	10 (10.4%)
Copyright violation is more in case of digital information.	30 (31.25%)	52(54.17%)	14(14.58%)
Users can misuse computers connected to the Internet.	33 (34.38%)	54(56.25%)	9 (9.37%)
Internet addiction wastes useful time.	40 (41.67%)	40(41.67%)	16(16.66%)

Table-13 portrays the demerits of the ICTs. It has been noticed that a

majority of the researchers (56.25%) agree that users can misuse computers, followed by 54.17% researchers who agreed with the point that copyright violation is more in case of digital information. 50% researchers disagreed with the variable related with traditional method of learning. 48.95% research scholars agree that they are not very clear about the quality of information available on the web. Around 46.9% strongly agreed that they faced difficulties in studying a long time on the computer screens, followed by several respondents (41.7%) who strongly agree that due to internet addiction, many users end up wasting their time. About 34.38% of the scholars strongly agree that misusing the computer and the internet happens daily. The 31.25% researchers strongly agree that copyright violation happens more in digital information followed by 27.1% researchers who strongly agree that respondents are not sure about the quality and reliability of the information available on the internet. Only 15.6% researchers strongly agree with the traditional way of learning.

TABLE-14

714 Problems Encountered While Using ICTs

Problems	**No. of Researchers**	**%age**
Limited or No ICT skills	22	22.92
Power failure	11	11.46
Lack of knowledge regarding hardware/software	41	42.7
Technological obsolescence	22	22.92
Total	**96**	100

The problems faced while using ICT tools are highlighted in Table-14. It represents that a majority of the responses (42.7%) lack knowledge regarding hardware/software, followed by 22.92% researchers who are facing problems of limited or no ICT skills. The same percentage of respondents (22.92%) faced technological obsolescence difficulty. Only 11.46 % faced problem relating to power failure while using ICT tools.

8 FINDINGS

- The study revealed that as compared to female Ph.D. researchers (35.42%) the percentage of male Ph.D. researchers (64.58%) was high.
- It had been seen that a majority of the Ph.D. researchers (94.79%) were aware of Information Communication Technologies.
- The study indicated that all the respondents used smartphones, followed by the laptop users (96.87%).

- Data presented that most of the researchers used ICT tools for internet searching and online reading.
- Majority of the researchers (64.58%) used digital devices daily, and their preferred place for using them were the department research labs (35.42%) and the central library (29.16%).
- The study found that most of the researchers (62.50%) were partially satisfied with the ICT tools available in their department research labs.
- According to the study, the majority of the respondents (97.92%) were familiar with search engines, followed by the researchers who were well acquainted with web portals (88.54%).
- The majority of the researchers (95.83%) had internet skills, and they daily used social networking sites such as E-mail (100%), WhatsApp (98.96%), YouTube (97.92%) and Facebook (91.67).
- The majority of research scholars (68.75%) were strongly agreed that the web resources/services helped in their research works.
- The data showed that the majority of researchers faced challenges such as lack of knowledge regarding hardware/software (42.7%), limited or no ICT skills (22.92%) and technological obsolescence (22.92%).
- The study depicted that the researchers also faced physical health issues after depending too much on ICT tools such as neck pain (35.4%), back pain (29.2%) and low eyesight (17.7%).

9 SUGGESTIONS

- Despite the fact that research scholars were more aware of ICTs, understanding of specific ICT products and ICT-based services highlighted the need for greater formal training on the usage of various ICT technologies through their research centers is needed.
- Research centers of each department may provide appropriate ICT-based facilities, which will help in their research productivity.
- The library hours should be suitable as far as possible for research scholars. It should be open 24 hours a day, seven days a week.
- A proper monitoring mechanism may be in place to avoid the misuse of internet resources. However, access to websites, such as, YouTube and other social network websites should be unblocked so that researchers can be aware of current events and information.
- Areas, where research scholars have difficulty in using ICT-based products and services have already been identified in this study, the department and concerned authorities should make necessary efforts to reduce them.

- The speed of internet connectivity and bandwidth is inadequate. The authorities may improve the bandwidth of the Wi-Fi and solve the connectivity issues.
- Research scholars' awareness regarding subject gateways and web directories are at moderate levels. As a result, research scholars require training, particularly for information retrieval processes.
- Researchers may be encouraged to keep up to date on the newest developments in ICTs regularly. Supervisors should provide proper advice and oversight.
- University officials should ensure the use of UGC-INFONET e-resources, Grammarly, and Turnitin. They must be given proper direction and guidance on the library's premises.

10 CONCLUSION

In today's modern information and digital world, smartphones, tablets, and computers have become part of our lives, the way information is collected, stored, accessed, and distributed has undergone a dramatic shift. Due to this, researchers are forced to overcome and adapt to the challenges posed by ICT technologies. To obtain the current and right information at the right time, the research scholars must be familiar and aware of the latest and upcoming ICT technologies. The present study thrown light on the awareness and various aspects of ICT and ICT based information services in Ph.D. research scholars of the Central University of Punjab, Bathinda. The study showed that most of the researchers were aware of Information and Communication Technologies. It was also observed that most of the Ph.D. scholars were partially satisfied with their department ICT facilities. Physical issues such as headaches, low back pain, poor vision, and neck pain had been observed using ICT equipment. Also, the current study reported that some of the internet resources were underutilized by the Ph.D. research scholars. Therefore, the library and the departments should come together to organise workshops which would enhance the research scholars' information literacy skills. Results also indicated the lack of knowledge regarding hardware and software. So digital literacy must be included in the syllabus of Ph.D. course works. Information and communication technologies are rapidly evolving day by day. As a result, research scholars must attend well-planned orientations to get acquainted with the most recent ICT-based technology in order to make better use of e-resources.

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