Computer literacy and student demographics: a study of select Indian universities

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Introduction and literature review

For decades, the gradual expansion of computer technology was being felt in our daily activities till the point where they became indispensible (Gannon-Leary *et al.*, 2003; Ajayi, 2013). Today's society may well be described as the "information society" because its infrastructure is essentially founded on information technology, computers and electronic communication systems (Honey, 2001; Polonoli, 2001; Goddard, 2002). Information and computer technology (ICT) also helps remove constraints of time and space making for increased flexibility and accessibility to information and education (Eteokleous, 2008a; Ktoridou and Eteokleous, 2011). The growth and development of any country depends largely upon the mobilization and diffusion of information (Goddard, 2002; Ktoridou and Eteokleous, 2011). Development in ICT provides for the opening up of several prospects creating new challenges for people and compelling them to access and acquire required skills such as computer literacy to take advantage from this development (Majid and Abazova, 1999). Computer literacy has ultimately come to be considered an important component of higher education (Tella and Mutula, 2008). Today, computer literacy has impacted very widely upon the daily life of students who tend to live, learn, and work on a computer (Rockman, 2005). They have easy access to and are successfully able to use the numerous types of information resources available on the web and in various databases (full-text and bibliographic) for academic pursuits.

Saadi (2007) defined computer literacy as the ability to achieve desired outcomes via a computer. Hall (2005) perceived that information literate individuals, in addition to knowing how to use the computer for word-processing, spreadsheets and internet access made use of increased learning opportunities provided by such technology. However, Murray (2003) described for a person to be information literate, an individual should be able to understand the kind of information which is needed and when it is needed and also have the ability to locate, evaluate, and effectively use information. Mitra (1998) describes computer literacy as the amount of computer knowledge acquired in the past and the length of computer usage. Vitolo and Coulston (2002) also mentioned "the link between information literacy and the use of information systems". The ability to use computers for performing personal and job related tasks, using internet browsers and to search for information on the web and to send and receive emails for purposes of communication purposes have increasingly become a crucial part of every one's skills (Singh and Singh, 2002). The terms computer literacy, computer competency and computer proficiency are sometimes used interchangeably even though these terms denote basic computer skills. The concept of digital and information literacy builds upon computer literacy (Johnson *et al.*, 2006).

Computer literacy connotes the capability of an individual to make use of computers and allied tools (Manowaluilou, 2008) for processing and retrieving information. It has proven pivotal in education while being an essential factor for accessibility to information besides being a significant part of the twenty-first century survival kit. It is mandatory for each student to be familiar with the many uses of computers. Developing computer competencies can be regarded as an advanced step on the path towards employment and a successful career (Hadjithoma and Eteokleous, 2007; Eteokleous, 2008b; Ktoridou and Eteokleous, 2011).

Computer literacy is not a new concept in developed nations, but it has still relevance in a developing nation like India. At present, a large amount of funds are being spent on e-resources and on the automation of academic libraries of India and the effective and efficient use of available electronic resources to a large extent depends upon computer literacy of library users. It is a fact that students would experience difficulties in searching for information using e-resources due to lack of computer usage. Frequent use of computers and the internet is indicative of achieving competency in computer literacy (Gibbs, 2008) and boosting of self-confidence and comfort level in using computer systems. Therefore, the present study has been conducted, in the Indian context, to investigate the level of computer literacy of students in order to search for required information successfully from e-resources available in university libraries. The study focuses on examining whether there were any differences in the computer literacy of students with respect to their demographics. For determining the level of computer literacy, the study took up the usage of the internet and OPACs by students as well as their self-assessment about their computer skills. The present study will provide useful information regarding the current status of computer literacy and in designing further computer literacy programs for university libraries in India and other developing nations.

An early study by Imel (1990) pointed out that merely identifying where information resources were

placed was inadequate for solving problems of information needs. Knowledge about requisite information searching skills was necessary for locating and retrieving the needed information. Geissler and Horridge (1993) stated that computer familiarity, computer experience, computer use, and computer ownership impacted widely upon the level of computer literacy. Furst-Bowe *et al.* (1995) analyzed various computer competencies for university students and found considerable differences in computer literacy among academics, but it also assumed that all students would obtain a similar level of related skills upon entering the university. Majid and Abazova (1999) carried out a study at the International Islamic University Malaysia to examine the relationship between computer literacy of academic staff and their use of electronic information sources. The study found a significant relationship between computer literacy and the use of electronic information sources and services. The study suggested the need for information literacy programs for effective use of the ever increasing volume of digital information.

Sweaney *et al.* (2001) cautioned against assumptions that all students possessed similar knowledge levels with computers before entering the university. Messineo and DeOllos (2005) also reported that computer competence was observed to be different especially among those students who used computers for their own personal and course-related tasks. According to a study by Wallace and Clariana (2005), incoming business students did not acquire the essential computer knowledge, skills, and that there was a need for an introductory computer course for new students. McNeil *et al.* (2006), in their study of nursing students emphasized the need for computer literacy skills before information literacy skills. Tella and Mutula (2008) revealed significant gender differences in computer literacy between female and male undergraduate students of the University of Botswana. Manowaluilou (2008) found statistically significant variations in the level of computer competency and information literacy of undergraduate students in the faculty of marketing from the time they entered and till they became graduates

from the university. Gripenberg (2011) demonstrated that the continuation of IT support to build up individuals' skills was essential as new skills were required for lifelong learning.

Ktoridou and Eteokleous (2011) discussed the importance of possessing computer literacy skills among unemployed women. Malliari *et al.* (2012) observed that IT self-efficacy and acquired computer competence were positively associated with the frequency of use of various electronic devices for day to day activities and prior internet experience and the frequency of use and extent of experience were also indicators of computer competence. Ajayi (2013) reported that the majority of students at a teaching hospital in Nigeria did not acquire computer skills and gained them through other means such as self-education, learning from friends, and practicing on their own. Baikady and Mudhol (2013) found that approximately 40 percent of respondents had adequate computer literacy skills, while nearly 51 percent possessed only average computer literacy skills. They recommended that it was essential to identify needs for information in electronic environments in order to develop plans for users' computer literacy instructions at higher studies levels.

Although there are a large number of studies in the literature on the use of electronic resources and the internet, there is a significant lack of empirical research on computer literacy with respect to student demographics. The present study is an attempt to determine whether or not student demographics have any influence on computer literacy in a university setting using Indian universities as a case study.

Objectives

The main purpose of this study is to investigate the levels of computer literacy among students in relation to their demographic characteristics in selected Indian universities to address the following objectives:

- examine the level of computer literacy among Indian students and research scholars;
- determine the relationship between the academic use of internet and

student demographics such as age, gender, and academic majors;
- study the association between student demographics and OPAC usage for searching information; and
- understand and evaluate the relationship between computer skills among students and their demographics.

The following null hypotheses were formulated to fulfill the purpose of the research study:

$H_0 1$. There is no significant difference between academic use of the internet and student demographics.
$H_0 2$. There is no significant difference between student demographics and OPAC use.
$H_0 3$. No significant differences exist between the students' attainment of computer skills and demographics.

Methodology

The study employed a survey to assess computer literacy based on the frequency of use of the internet and OPACs by students. Respondents were requested to indicate what perception they had of computer usage skills on the basis of their self-assessment. The survey was carried out among students and research scholars in three major universities of Northern India: the Panjab University, Chandigarh, the Punjabi University, Patiala, and the Guru Nanak Dev University, Amritsar. We used a closed-ended questionnaire, which was pre-tested on 20 users of the Panjab University, Chandigarh. Required changes were made to promote better delivery and understanding of the questionnaire. This was supplemented by informal interviews and observations which were also utilized as additional tools to obtain precise data. A stratified-random sampling technique was used for generating a representative sample for the research study. A total of 426 questionnaires were distributed, out of which 329 were returned for a response rate of 77 percent. The data collected was analyzed using SPSS to obtain simple percentages. χ^2 statistical measures were applied to analyze

comparability of the data sets. A level of statistical significance (p) of less than 0.05 was employed to find out whether there was any relationship of student demographics with the frequency of their use of the internet and OPACs besides the level of computer skills acquired.

Analysis and research findings

In the following results the categories of "very frequently and frequently" and "excellent and above average" categories were merged. Out of a total of 329 respondents, 240 (72.9 percent) and 89 (27.1 percent) were postgraduate students and research scholars, respectively. On the basis of subject of academic majors, there were 100 (30.4 percent) respondents belonging to the social sciences, 86 (26.1 percent) belonging to the basic sciences, and 71 (21.6 percent) belonging to the applied sciences as also 72 (21.9 percent) belonging to the humanities. On the basis of gender, there was an almost equal distribution with 167 (50.8) respondents being male and 162 (49.2 percent) being female. According to age groups, a majority of the respondents, 264 (80.2 percent) were under 26 and 85 (19.2 percent) of respondents were between the ages of 26 and 35. Tables I-IV show our results.

In Table I, when the results from the χ^2-tests were considered, the values of significance (p) were found to be insignificant at the 0.409, 0.062 and 0.277 levels (>0.05), respectively, for student categories, gender and age groups accordingly. Hence, no significant differences were observed for computer usage with regard to student demographics on the basis of their gender, demographic categories and age groups. The χ^2 analysis indicates that there were significant variations for computer use among the various academic majors ($p = 0.022 < 0.05$). In Table II, the results of the χ^2-tests, showed the differences among student categories and gender, were found to be insignificant ($p = 0.169$ for category; $p = 0.070$ for gender) for internet usage. The χ^2 analysis revealed that p-values of 0.044 and 0.017, respectively, for academic majors and age groups were statistically significant (<0.05).

Table I.
Use of computers and student demographics

| Student characteristics | Use of computer | | | χ^2 results |
	Yes	No	Total	
Student category				
Research scholars	87 (97.8)	2 (2.2)	89 (100)	χ^2 value = 0.681
Postgraduates	230 (95.8)	10 (4.2)	240 (100)	df = 1
				$p = 0.409$
Academic majors				
Basic sciences	83 (96.5)	6 (3.5)	86 (100)	χ^2 value = 9.622
Applied sciences	71 (100.0)	0 (0.0)	71 (100)	df = 3
Social sciences	99 (99.0)	1 (1.0)	100 (100)	$p = 0.022$
Humanities	67 (93.1)	5 (6.9)	72 (100)	
Gender				
Male	164 (98.2)	3 (1.8)	167 (100)	χ^2 value = 3.303
Female	153 (94.4)	9 (5.6)	162 (100)	df = 1
				$p = 0.062$
Age				
<26	253 (95.8)	11 (4.2)	264 (100)	χ^2 value = 1.025
26-35	64 (98.5)	1 (1.5)	65 (100)	df = 1
				$p = 0.277$

Notes: Figures in parentheses indicate percentage; $n = 329$

Hence, there were significant differences for internet utilization with respect to academic majors and the age group to which the students belonged. The χ^2 results partially support the null hypothesis that there is no significant difference between the academic use of the internet and student demographics. In Table III's χ^2 analysis, the p-values for student category and age group, respectively, were found to be insignificant at the 0.638 and 0.467 levels (>0.05). Hence, the analysis indicates that there were no significant variations for OPAC use with regard to the demographic category and age group of the students. There is a significant percentage (46.1 percent male and 38.3 percent female) who accessed OPACs regularly. There was also a small group (27.2 percent male and 29.2 percent female) that accessed OPACs occasionally. The χ^2 analysis indicates that there were significant differences among various academic majors and gender on the OPAC use at the 0.001 and 0.004 levels, respectively. In view of the above findings, the null hypothesis that there is no significant difference between student demographics and their OPAC usage for searching and locating information on intended documents is partially proved and accepted. In Table IV, the χ^2 results showed that the p-values for all the student demographics were

statistically insignificant and the null hypothesis was that no significant differences exist between the students' attainment of computer skills and their demographics is verified by the analysis.

The study only revealed significant differences for computer use among various academic majors. There were no statistically significant differences for computer usage on the parameters pertaining to student categories, gender and age. This clearly indicates that gender and age of students did not have any influence on computer utilization. A majority of students in this study reported that they made regular academic use of the internet. There were significant variations for internet usage with respect to academic majors and age. The higher use of the internet was observed among research scholars, although there were statistically no significant variations between both categories, i.e. research scholars and postgraduate students. Similarly, male students made more academic use of internet in comparison to their female counterparts, but statistically no significant differences were noticed between male and female students, as the results were borderline ($p = 0.07 > 0.05$). Thus, gender and academic status did not influence the use of web resources for academic purposes.

Table II.

Academic use of internet and student demographics

Student characteristics	V. freq.	Freq.	Occ.	Rarely	Never	Total	χ^2 results
Student category							
RS	17 (19.1)	38 (42.7)	24 (27.0)	7 (7.9)	3 (3.4)	89 (100)	χ^2 value = 6.438
PG	59 (24.6)	82 (34.2)	60 (25.0)	35 (14.6)	14 (5.8)	240 (100)	df = 4
							$p = 0.169$
Academic majors							
Bas. sci.	14 (16.3)	28 (32.6)	24 (27.9)	13 (15.1)	7 (8.1)	86 (100)	χ^2 value = 21.435
App. sci.	22 (31.0)	30 (42.3)	15 (21.1)	4 (5.6)	0 (0.0)	71 (100)	df = 12
S. sci.	26 (26.0)	27 (27.0)	27 (27.0)	16 (16.0)	4 (4.0)	100 (100)	$p = 0.044$
Human.	14 (19.4)	30 (41.7)	13 (18.1)	9 (12.5)	6 (8.3)	72 (100)	
Gender							
Male	48 (28.7)	57 (34.1)	38 (22.8)	19 (11.4)	5 (3.0)	167 (100)	χ^2 value = 8.575
Female	28 (17.3)	58 (35.8)	41 (25.3)	23 (14.2)	12 (7.4)	162 (100)	df = 4
							$p = 0.070$
Age							
<26	64 (24.2)	95 (36.0)	53 (20.1)	37 (14.0)	15 (5.7)	264 (100)	χ^2 value = 12.102
26-35	12 (18.5)	20 (30.8)	26 (40.0)	5 (7.7)	2 (3.1)	65 (100)	df = 4
							$p = 0.017$

Notes: RS – research scholars, PG – postgraduates, App. – applied, Bas. – basic, S. – social, Sci. – sciences, Human. – humanities, V. – very, Freq. – frequently, Occ. – occasionally; figures in parentheses indicate percentage; $n = 329$

Table III.

Frequency of OPAC use and student demographics

Student characteristics	Unaware	V. freq.	Freq.	Occ.	Rarely	Never	χ^2 results
Student category							
RS	3 (3.4)	8 (9.0)	34 (38.2)	20 (22.5)	8 (9.0)	16 (18.0)	χ^2 value = 3.401
PG	12 (5.0)	22 (9.2)	75 (31.3)	74 (30.8)	22 (9.2)	35 (14.6)	df = 5
							$p = 0.638$
Academic majors							
Bas. sci.	5 (5.8)	1 (1.2)	27 (31.4)	22 (25.6)	5 (5.8)	26 (30.2)	χ^2 value = 37.653
App. sci.	2 (2.8)	9 (12.7)	23 (32.4)	26 (36.6)	3 (4.2)	8 (11.3)	df = 15
S. sci.	4 (4.0)	15 (15.0)	31 (31.0)	29 (29.0)	12 (12.0)	9 (9.0)	$p = 0.001$
Human.	4 (5.6)	5 (6.9)	28 (38.9)	17 (23.6)	10 (13.9)	8 (11.1)	
Gender							
Male	11 (6.6)	21 (12.6)	56 (33.5)	50 (29.9)	14 (8.4)	15 (9.0)	χ^2 value = 17.241
Female	4 (2.5)	9 (5.6)	53 (32.7)	44 (27.2)	16 (9.9)	36 (22.2)	df = 5
							$p = 0.004$
Age							
<26	10 (3.8)	25 (9.5)	83 (31.4)	77 (29.2)	25 (9.5)	44 (16.7)	χ^2 value = 4.595
26-35	5 (7.7)	5 (7.7)	26 (40.0)	17 (26.2)	5 (7.7)	7 (10.8)	df = 5
							$p = 0.467$

Notes: RS – research scholars, PG – postgraduates, App. – applied, Bas. – basic, S. – social, Sci. – sciences, Human. – humanities, V. – very, Freq. – frequently, Occ. – occasionally; figures in parentheses indicate percentage; $n = 329$

It was observed that a higher percentage from the lower age groups was more inclined to explore material on the web. It is apparent that the field of subject majors impacted upon the respondents searching for academic information on the internet. There were significant differences for searching information on OPACs with regard to various academic majors and gender. But there were no significant variations observed for accessing OPACs in regards to categories and ages of students. Academic majors and genders of students influenced the frequency of OPAC use, while academic status and age of the students did not have any impact on OPAC use. When the respondents were asked to report their self-assessment of computer competence, less than half the respondents stated that they had achieved adequate computer skills. It was surprising that there were no significant differences between computer skills and age groups, academic majors, gender and academic status. Therefore, none of student demographics had any effect on computer competence.

Table IV.
Computer skills and student demographics

Student characteristics	Exc.	Above average	Average	Below average	Extr. poor	Total	χ^2 results
Student category							
RS	11 (12.4)	31 (34.8)	33 (37.1)	12 (13.5)	2 (2.2)	89 (100)	χ^2 value = 2.764
PG	36 (15.0)	74 (30.9)	99 (41.4)	24 (10.0)	5 (2.1)	240 (100)	df = 4
							p = 0.598
Academic majors							
Bas. sci.	11 (12.8)	28 (32.6)	39 (45.3)	7 (8.1)	1 (1.2)	86 (100)	χ^2 value = 10.059
App. sci.	13 (18.3)	22 (31.0)	28 (39.4)	8 (11.3)	0 (0.0)	71 (100)	df = 12
S. sci.	12 (12.0)	33 (33.0)	40 (40.0)	10 (10.0)	5 (5.0)	100 (100)	p = 0.611
Human.	11 (15.3)	29 (40.3)	25 (34.7)	6 (8.3)	1 (1.4)	72 (100)	
Gender							
Male	29 (17.4)	56 (33.5)	62 (37.1)	15 (9.0)	5 (3.0)	167 (100)	χ^2 value = 4.302
Female	18 (11.1)	56 (34.6)	70 (43.2)	16 (9.9)	1 (1.2)	162 (100)	df = 4
							p = 0.367
Age							
<26	40 (15.2)	85 (32.2)	109 (41.3)	25 (9.5)	5 (1.9)	264 (100)	χ^2 value = 2.873
26-35	7 (10.8)	27 (41.5)	23 (35.4)	6 (9.2)	2 (3.1)	65 (100)	df = 4
							p = 0.585

Notes: RS – research scholars, PG – postgraduates, App. – applied, Bas. – basic, S. – social, Sci. – sciences, Human. – humanities, Exc. – excellent, Extr. – extremely; figures in parentheses indicate percentage; $n = 329$

It can be deduced that the findings of the present study did not conform to the general perception that student demographics have an impact on computer competencies. In this study, student demographics did not influence the searching of information on the internet or OPACs for academic pursuits. The results of this study showed certain similarities and dissimilarities with the earlier studies conducted by various researchers. The findings of the present study are in conformity with the previous study by Woodrow (1991) that the gender of students had no correlation with their computer literacy. This study also supports the findings of the previous studies by Woodrow (1991) and Majid and Abazova (1999) that no significant differences were found among individuals from different age groups with regard to computer skills and OPAC use. Further, the findings of this study corroborate the Selwyn (2008) study that there were significant differences among students' subjects of study and their academic use of the internet. The results of some earlier works of Majid and Abazova (1999), Jackson *et al.* (2001), Selwyn (2008) and Tella and Mutula (2008) were contrary to those of this study in the fact that there were significant differences between male and female respondents accessing and utilizing computer skills.

Conclusion

This study was an effort to assess students' computer literacy and their ability to search academic information from electronic resources and databases on the basis of use of web resources and OPACs and their perception about computer skills gained by them. Students were not confident in searching information from electronic resources and also are not fully computer proficient to an extent that they are able to retrieve academic information from electronic resources and databases. There is an observable lack of computer literacy among students even at the university level. This study adds to the findings of some of the previous studies (McNeil *et al.*, 2006; Ajayi, 2013; Baikady and Mudhol, 2013) that students did not acquire appropriate computer literacy skills.

Our study found that student demographics did not have a great impact on computer competencies. However, the study does infer that that university libraries should arrange for separate computer literacy education programs besides those for information literacy so that they can make the best use of available electronic resources. The present study is limited to the three major universities of the Union Territory of Chandigarh and Punjab State, India so we also recommend that similar studies be undertaken in university libraries elsewhere.

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