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Knowledge and use of electronic information resources by Post graduate Engineering students of Karnataka state: A study

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Abstract

The present study is an attempt to know the knowledge and use of electronic information resources by post graduate engineering students studying in 16 Autonomous engineering colleges of Karnataka state. The study involved 1064 post graduate engineering students and found that 100% students use electronic information resources. The study also revealed that e-journals are the most preferred e-resources and the library notice board along with library websites are the major sources of creating awareness about the availability of e-resources. However, the trial and error method was highly used to use e-resources followed by self-study and library orientation. The study found that keyword search is highly preferred and the VTU consortium is a highly preferred gateway for accessing the e-resources. Engineering students lack the skill of selecting the right search term. Apart from this slow internet connectivity also hinders the effective use of e-resources.

Keywords: E-resources, Mode of learning, VTU Consortium, Engineering, Karnataka

1. Introduction

The rapid development of Information and Communication Technology (ICT) and its application in libraries have revolutionized the use and access to information. Due to the influence of ICT, present-day libraries have been focusing more on subscribing to e-resources and providing access to those e-resources that ensure convenient and effortless access to varied information sources (Sharma et al., 2018). As a result, e-resources have become the most sought by the users and modern libraries attempt to satisfy the varied needs of their clientele (Kandpal and Vithal, 2013). Meanwhile, the impact of the internet and electronic information sources on engineering students has been enormous during the last few decades.

The use of e-resources among engineering students has been witnessed and documented in several previous studies (Puttaswamy and Krishnamurthy, 2014; Choudhury, 2015; Mani and Thirumagal, 2016; Nandi and Gavisiddappa, 2020).

Realizing the significance of e-resources, engineering colleges have been subscribing to a large number of e-resources available through various sources. All India Council of Technical Education (AICTE) has also mandated subscription to e-resources by the libraries of engineering colleges (Chandrashekar and Dharani Kumar, 2018). The present study intended to find out the status of accessing e-resources by the engineering students of selected colleges of Karnataka state.

2. Need for the study

Advancements in Information and Communication Technology (ICT) and its application to libraries have brought the change in libraries to make information resources available in electronic format along with conventional print format. The e-information is increasing exponentially year after the year and has been accessed by stakeholders of engineering education in general and students in particular. The students' demands have to be addressed by the e-resources and libraries of engineering colleges need to focus more on their satisfaction. Hence the study needs to be undertaken to assess the students' perception towards e-resources. So far, a good number of studies on engineering students' use of e-resources have been conducted. Meanwhile, a study focusing on top-ranked engineering colleges in Karnataka state has not been undertaken. Therefore, it is essential to conduct a study on the knowledge of e-resources and its use by engineering students which provides insights into the students' behaviour in the use of electronic resources for academic and other purposes.

3. Objectives of the study

- To determine the demographic profile of the participants in the study
- To determine the extent to which postgraduate engineering students from diverse fields of study use e-resources.
- To determine the purpose of using e-resources among post-graduate engineering students.
- To elucidate the modes and gateways used for accessing e-resources.
- To investigate the difficulties encountered by postgraduate engineering students in accessing e-resources.

4. Methodology

In this study 16 Autonomous engineering colleges in Karnataka state has been selected. The selection of colleges is based on their active participation under the VTU consortium and the availability of students who use e-resources for academic and research purposes.

4.1 Selection of Sample

The following formula given by Krejcie and Morgan (1970) was used to calculate the sample size.

$$S = \frac{x^2 NP(1 - P)}{d^2(N - 1) + x^2 P(1 - P)}$$

Here,

S = required sample size; x^2 = the table value of Chi-square for 1 degree of freedom at the desired confidence level (6.64); N = the population size (1774); P = the population proportion (assumed to be 0.5); d = the degree of accuracy expressed as 'p' (i.e. Margin of error=0.025).

Hence, the above said formula can be written as follows:

$$S = \frac{5889.68 (0.5)}{0.000625 \times 1773 + 3.32(0.5)}$$
$$S = 1063.84$$

Using the above formula sample size to be taken was 1063.84 and has been rounded off to 1064. The study has adopted a proportionate sampling technique to obtain the required sample size for each college proportionately (Table-1).

4.2 Survey tool and data analysis

In the present study, to collect primary data from Post graduate engineering students of Autonomous Engineering colleges, the Survey method was employed using a structured questionnaire. The target population for the study was engineering students. So that caution was taken to include branch-wise viz. Mechanical, Electrical and Electronics, Electronics and Communication, Civil, Biotechnology, and Computer Science To generate relevant findings, the acquired data was evaluated using appropriate statistical tools such as percentages and average means. MS-Excel and SPSS 21.0 version software packages were used to statistically analyze the data.

5. Analysis and Interpretation of data

Table-1: College-wise distribution of respondents

Name of the college	Total responses	Percentage
Malanad College of Engineering	35	3.29
SDM College of Engineering and technology	42	3.95
Gogte College of engineering	43	4.04
New Horizon college of engineering	13	1.22
Siddaganga Institute of Technology	66	6.20

Ambedkar Institute of Technology	49	4.61
National Institute of Engineering	94	8.83
BMS College of Engineering, Bengaluru	116	10.90
M.S. Ramaiah Institute of Technology	119	11.18
Dayanandsagar College of Engineering, Bengaluru	84	7.89
NITTE, Nitte	50	4.70
PDA, Gulbarga	57	5.36
Basveshwara College of Engineering, Bagalkot	47	4.42
RV College of Engineering, Bengaluru	150	14.10
NMIT, Bangalore	61	5.73
PES, College of Engineering, Mandya	39	3.67
Total	1064	100.00

Table-1 indicates the college-wise distribution of respondents. Of the 1064 respondents, 150 have belonged to RV College of Engineering accounted for 14.10% followed by M.S. Ramaiah Institute of Technology (11.18%) and BMS College of Engineering (10.90%). The rest of the colleges have less than 10% of respondents. The number of respondents per college is corresponding to their share of the population.

Table-2: Distribution of respondents branch-wise

Branch of study	Number	Percentage
Mechanical Engineering	193	18.14
Electronics and communications	228	21.43
Civil Engineering	238	22.37
Computer Science Engineering	279	26.22
Bio Technology	28	2.63
Electrical and Electronics	98	9.21
Total	1064	100.00

Table-2 shows the distribution of respondents branch-wise. Of the 1064 respondents, the majority have belonged to Computer Science (26.22%) followed by Civil Engineering (22.37%), Electronics and Communication (21.43%), and Mechanical Engineering (18.14%). A very meager number of students are responded from Electrical and Electronics (9.21%) and Bio-Technology (2.63%) branches.

Table-3: Use of e-resources

Use	Number	Percentage
Yes	1064	100.00
No	0	0.00
Total	1064	100.00

There are plenty of electronic resources in the form of databases, journals, e-books, and reports, etc that are available through the internet. Another question has been asked to know the use of various electronic information resources. The details are given in table-3.

Table-4: Branch-wise use of electronic resources

Electronic resources	Branch-wise mean values					
	M	E&C	CE	CS	BT	E&E
E-Books	2.77	3.69	3.23	3.96	4.07	3.80
E-Journals	4.39	4.43	4.47	4.66	4.54	4.50
E-Conference Proceedings	1.84	2.88	1.98	2.61	1.57	2.99
E-Standards & specifications	1.33	1.37	1.61	1.14	1.00	1.45
E-Patents	1.05	1.14	1.06	1.16	1.00	1.24
E-Thesis and Dissertations	1.35	1.36	1.64	1.83	1.29	1.60
E-News papers & Magazines	2.56	2.24	2.22	2.35	2.11	2.31
E-Databases (bibliographic)	1.07	1.09	1.07	1.08	1.11	1.14
Blogs, Wikis, etc.,	1.68	1.94	1.32	2.13	1.14	2.19
Institution repositories	3.41	3.61	3.11	3.30	3.25	3.40

5 - To a Great extent, 4 - To a moderate extent, 3 - To a little Extent, 2 - As and when required, 1 - Not at all

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

An attempt has been made to know the extent of use of e-resources by respondents who belonged to different branches of engineering. Table-4 reveals that the majority of respondents belonged to Mechanical (mean=4.39), Electronics and communication (mean=4.43), Civil engineering (mean=4.47), Computer science (mean=4.66), Biotechnology (mean=4.50), and Electrical and Electronics (mean=4.54) use e-journals.

Further analysis shows that the use of e-book follows the use of e-journals among the respondents of Electronics and communication (mean=3.69), Civil engineering (mean=3.23), Computer science (mean=3.96), Biotechnology (mean=4.07), and Electrical and Electronics (mean=3.80) branches. The respondents who belonged to Mechanical engineering use institutional repository (mean=3.41) after the use of e-journals.

Table-5: Source of awareness about e-resources: by respondents' branch

Sources	Branches
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	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
Library orientation	136 (70.47)	185 (81.14)	168 (70.59)	211 (75.63)	20 (71.43)	81 (82.65)
Friends	145 (75.13)	166 (72.81)	145 (60.92)	171 (61.29)	14 (50.00)	51 (52.04)
Notice board	181 (93.78)	204 (89.47)	224 (94.12)	262 (93.91)	28 (100.00)	86 (87.76)
Library website	160 (82.90)	182 (79.82)	189 (79.41)	221 (79.21)	23 (82.14)	78 (79.59)
Faculty members	131 (67.88)	150 (65.79)	138 (57.98)	205 (73.48)	22 (78.57)	65 (66.33)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-5 indicates the sources of awareness about e-resources by respondents who belonged to different branches of engineering. The majority of respondents who belonged to every branch of engineering obtain awareness from the notice board. For the respondents of mechanical engineering (82.90%), Civil engineering (79.41%), Computer science (79.21%), Biotechnology (82.14%), library website is the second major source of awareness. Whereas the respondents of Electronics and communication (81.14%), Electrical and Electronics Engineering (82.65%) have obtained awareness from library orientation.

Table-6: Frequency of use of e-resources: by respondents' branch

Frequency	Branches						Total
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)	
Daily	2 (1.04)	41 (17.98)	0 (0.00)	51 (18.28)	0 (0.00)	16 (16.33)	110 (10.34)
3-4 days in a week	38 (19.70)	58 (25.44)	8 (3.36)	11 (3.94)	7 (25.00)	16 (16.33)	138 (12.97)
Weekly	71 (36.80)	63 (27.63)	173 (72.70)	108 (38.71)	18 (64.29)	29 (29.59)	462 (43.42)
Fortnightly	39 (20.20)	16 (7.02)	3 (1.26)	7 (2.51)	0 (0.00)	8 (8.16)	73 (6.86)
Once in a month	37 (19.20)	4 (1.75)	52 (21.90)	4 (1.43)	0 (0.00)	3 (3.06)	100 (9.40)
Occasionally	6 (3.11)	46 (20.18)	2 (0.84)	98 (35.13)	3 (10.71)	26 (26.53)	181 (17.01)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-6 depicts the frequency of use of e-resources by the respondents who belonged to six engineering branches. The majority of respondents belonged to mechanical engineering use e-resources weekly (36.80%) followed by fortnightly (19.20%), and 3-4 days in a week (19.70%). Meanwhile, the majority of

respondents of the E&C branch use e-resources weekly (27.63%) followed by 3-4 days in a week (25.44%). Interestingly, more than 70% of respondents who belonged to the Civil Engineering branch use library subscribed to e-resources weekly (72.70%). The majority of respondents who belonged to the computer science branch stated that they use e-resources weekly (38.71%) and 64.29% of respondents who belonged to Biotechnology use e-resources.

Table-7: Purpose of use of electronic information sources

Purpose	Extent of Use					Mean
	To a great extent	To moderate extent	To a little extent	Rarely	Never	
To update the knowledge (general)	211 (19.83)	411 (38.63)	266 (25.00)	152 (14.29)	24 (2.26)	3.59
To study and prepare notes for academics (Exam)	370 (34.77)	382 (35.90)	203 (19.08)	85 (7.99)	24 (2.26)	3.93
For Research (project work, Dissertation)	279 (26.22)	440 (41.35)	168 (15.79)	121 (11.37)	56 (5.26)	3.72
To prepare for seminars, conferences and workshops	399 (37.50)	220 (20.68)	302 (28.38)	119 (11.18)	24 (2.26)	3.80
To write an article for a publication	275 (25.85)	164 (15.41)	263 (24.72)	144 (13.53)	218 (20.49)	3.13

It is evident from the data presented in table-7 that the majority of respondents to a greater extent use e-resources to prepare for seminars, conferences, and workshops (37.50%) followed by to study and prepare notes for examination (34.77%), and to do research works (26.22%). To a moderate extent, the majority of respondents use e-resources to do research work (41.35%) followed by to update knowledge (38.63%) and to study and prepare notes for examination (35.90%).

Table-8: Branch-wise level of satisfaction with the e-resources subscribed by the library

Branches	Level of satisfaction					Mean
	Highly satisfied	Satisfied	Neutral	Dissatisfied	Highly dissatisfied	
Mechanical (N=193)	38 (19.69)	97 (50.26)	33 (17.10)	15 (7.77)	10 (5.18)	3.72
Electronics and communication (N=228)	12 (5.26)	149 (65.35)	23 (10.09)	23 (10.09)	21 (9.21)	4.10
Civil engineering (N=238)	3 (1.26)	119 (50.00)	107 (44.96)	2 (0.84)	7 (2.94)	3.46
Computer science (N=279)	46 (16.49)	156 (55.91)	21 (7.53)	29 (10.39)	27 (9.68)	3.59

Biotechnology (N=28)	3 (10.71)	20 (71.43)	5 (17.86)	0 (0.00)	0 (0.00)	3.93
Electrical and Electronics (N=98)	1 (1.02)	50 (51.02)	15 (15.31)	19 (19.39)	13 (13.27)	3.07

It is evident from the data presented in table-8 that the majority of respondents who belonged to Biotechnology (71.43%), Electronics and communication (65.35%), Computer science (55.91%), Electrical and Electronics (51.02%), Mechanical (50.26%), and Civil engineering (50%) are satisfied with the subscribed e-resources. The highest level of satisfaction is shown by respondents who belonged to Mechanical engineering (19.69%) followed by Computer Science Engineering (16.49%), and Biotechnology branches (10.71%). Table-52 also indicates that the highest level of dissatisfaction towards subscribed e-resources has been shown by the respondents who belonged to the Electrical and Electronics branch.

Table-9: Modes of learning to use e-resources

Modes of learning to use e-resources	Branches					
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
Self Learning by trial and error method	116 (60.10)	193 (84.65)	222 (93.28)	227 (81.36)	28 (100.00)	78 (79.59)
Self study (reading books/articles/Tutorials)	109 (56.48)	113 (49.56)	12 (5.04)	105 (37.63)	13 (46.43)	29 (29.59)
By library orientation (guidance of library staff)	110 (56.99)	170 (74.56)	221 (92.86)	222 (79.57)	28 (100.00)	48 (48.98)
With the assistance of friends	72 (37.31)	75 (32.89)	138 (57.98)	102 (36.56)	7 (25.00)	24 (24.49)
Guidance from faculty members	77 (39.90)	65 (28.51)	70 (29.41)	18 (6.45)	0 (0.00)	20 (20.41)
By attending courses, workshops offered by the college	72 (37.31)	66 (28.95)	9 (3.78)	72 (25.81)	0 (0.00)	26 (26.53)
By attending formal Courses (paid)	1 (0.52)	0 (0.00)	2 (0.84)	0 (0.00)	0 (0.00)	0 (0.00)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-9 shows that the majority of respondents who belonged to mechanical (60.10%), electrical and communication (84.65%), civil (93.28%), computer science (81.36%), biotechnology (100%), and electrical and electronics (79.59%) use ‘trial and error methods’ to learn the use of e-resources. It is followed by ‘library orientation’ and ‘self-study’ are other modes of learning about the use of e-resources among respondents of all six branches of engineering. It is interesting to know that nearly 40% of respondents who belonged to mechanical engineering

obtain ‘guidance from the faculty members’ whereas 57.98% of respondents who belonged to civil engineering obtain ‘assistance from friends’ in the use of e-resources.

Table-10: Opinion about benefits of using electronic resources by respondents’ branch

Benefits	Branches					
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
Better access to information	4.60	4.40	3.78	4.45	4.75	4.28
Time saving	4.16	4.37	3.93	4.47	4.29	4.17
Access to current (up-to-date) information	4.35	3.14	3.49	3.52	4.07	3.15
24/7 and seamless access to information	3.97	4.54	3.92	3.95	4.57	4.35
Access to comprehensive information	3.77	2.89	3.59	2.51	1.75	2.97
Available in different formats (pdf, html, word etc.,)	4.22	2.90	3.50	3.13	2.71	3.13
Has increased professional collaboration with others	3.83	1.79	4.29	2.26	1.00	2.30
Decrease in the use of Printed sources	4.38	3.39	3.89	3.16	2.18	3.35
Easy portability of Information(copy, E-mail etc.,)	4.21	4.53	3.58	4.31	4.82	4.27
Can manage references Easily	3.78	2.77	3.56	3.22	2.75	3.06
Hyperlinks	3.59	3.59	3.71	3.65	3.46	3.59

5 - To a Great extent, 4 - To a moderate extent, 3 - To a little Extent, 2 - As and when required, 1 - Not at all

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table -10 shows the respondents’ opinion towards the benefits of the use of e-resources cross-tabulated by branches of engineering. The majority of respondents who belonged to mechanical engineering opined that e-resource has the benefits such as better access to information (mean=4.60), access to current information (mean=4.35), and decreased use of print resources (mean=4.38). The respondents who belonged to Electronics and Communication felt that the e-

resources are advantageous because of 24/7 seamless access to information (mean=4.54), easy portability of information (mean=4.53), better access to information (mean=4.40), and time-saving (mean=4.37). The majority of respondents who belonged to civil engineering opined that the use of e-resources is beneficial because it has increased professional collaboration with others (mean=4.29) and saves time (mean=3.93). The majority of respondents of Computer science stated that time-saving (mean=4.47), better access to information (mean=4.45), and easy portability (mean=4.31) are the benefits of e-resources. The respondents who belonged to biotechnology opined that easy portability of information (mean=4.82), better access to information (mean= 4.75), and 24/7 access to information (mean=4.57) are the benefits of e-resources. Finally, the respondents of the Electrical and Electronics branch opined that 24/7 access to information (mean=4.35), better access to information (mean=4.28), easy portability of information (mean=4.27), and time-saving (mean=4.17) are the benefits of e-resources.

Table-11: Search approaches used to access Electronic Information resources by respondents' branches

Search approach	Branches					
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
Title of article	145 (75.13)	217 (95.18)	227 (95.38)	240 (86.02)	28 (100.00)	91 (92.86)
Journal title	40 (20.73)	219 (96.05)	215 (90.34)	277 (99.28)	28 (100.00)	91 (92.86)
Keyword	114 (59.07)	223 (97.81)	229 (96.22)	277 (99.28)	28 (100.00)	94 (95.92)
Author	116 (60.10)	220 (96.49)	223 (93.70)	277 (99.28)	28 (100.00)	91 (92.86)
Date of publication	36 (18.65)	41 (17.98)	7 (2.94)	90 (32.26)	0 (0.00)	36 (36.73)
Table of content	80 (41.45)	199 (87.28)	18 (7.56)	271 (97.13)	28 (100.00)	65 (66.33)
Publisher name	37 (19.17)	39 (17.11)	88 (36.97)	137 (49.10)	0 (0.00)	34 (34.69)
ISSN	2 (1.04)	0 (0.00)	1 (0.42)	0 (0.00)	0 (0.00)	0 (0.00)
ISBN	0 (0.00)	0 (0.00)	1 (0.42)	0 (0.00)	0 (0.00)	0 (0.00)
DOI	9 (4.66)	213 (93.42)	217 (91.18)	173 (62.01)	28 (100.00)	94 (95.92)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-11 indicates that the majority of respondents who belonged to mechanical engineering use the title of the article (75.13%) followed by the author (60.10%). A different approach has been shown by the respondents of electronics and communication who use keyword (97.81%) followed by author (96.9%), journal title (96.05%), the title of the article (95.18%), and DOI (93.42%). The majority of respondents of civil engineering use keywords (96.22%) followed by the title of the article (95.38%), author (93.70%), and DOI (91.18%). Meanwhile, the respondents who belonged to computer science use keyword, author, and journal-title as the search approaches which accounted for 99.28% followed by the table of content (97.13%). The 100% of respondents who belonged to the biotechnology branch use the approaches such as Keyword, the title of the article, journal title, author, table of content, and DOI. Further analysis shows that the majority of respondents who belonged to electrical and electronics use keyword and DOI (95.92%) followed by author, journal title, and title of the article accounted for 92.86% as search approaches.

Table-12: Gateways used to access electronic information resources by respondents' branches

Gateways	Branches					
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
VTU Consortium	114 (59.07)	219 (96.05)	222 (93.28)	277 (99.28)	28 (100.00)	91 (92.86)
E-shodhsindhu	4 (2.07)	3 (1.32)	5 (2.10)	5 (1.79)	2 (7.14)	4 (4.08)
DELNET	9 (4.66)	11 (4.82)	44 (18.49)	137 (49.10)	0 (0.00)	10 (10.20)
NPTEL	55 (28.50)	125 (54.82)	148 (62.18)	147 (52.69)	18 (64.29)	28 (28.57)
DOAJ	6 (3.11)	51 (22.37)	4 (1.68)	93 (33.33)	0 (0.00)	17 (17.35)
National Digital Library (NDL)	17 (8.81)	56 (24.56)	18 (7.56)	75 (26.88)	4 (14.29)	21 (21.43)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-12 shows that the majority of respondents who belonged to mechanical (59.07%), Electronics and communication (96.05%), Civil (93.28%), Computer science (99.28%), Biotechnology (100%), and Electrical and Electronics (92.86%) branches use VTU consortium as the gateway to use e-resources. Quite a good percentage of respondents of all engineering branches use NPTEL as another gateway to access e-resources. Interestingly, DELNET (49.10%), DOAJ (33.33%), and National Digital Library (26.88%) are used as major gateways by the

respondents who belonged to computer science. Moreover, NPTEL is used by 64.29% of respondents who belonged to the Biotechnology branch.

Table-13: Problems encountered while using electronic resources by respondents' branches

Problems	Branches					
	M (N=96)	E&C (N=49)	CE (N=72)	CS (N=78)	BT (N=4)	E&E (N=22)
Lack of computers with the internet facilities in college	12 (12.50)	10 (20.41)	2 (2.78)	9 (11.54)	0 (0.00)	2 (9.09)
Power failure/power cuts	21 (21.88)	13 (26.53)	30 (41.67)	17 (21.79)	0 (0.00)	2 (9.09)
Slow internet connectivity	48 (24.87)	67 (29.39)	33 (13.87)	74 (26.52)	4 (14.29)	28 (28.57)
Inability to use computer/ lack of IT skills	1 (1.04)	17 (34.69)	5 (6.94)	2 (2.56)	1 (25.00)	11 (50.00)
Selecting Search terms	37 (38.54)	39 (79.59)	45 (62.50)	34 (43.59)	1 (25.00)	17 (77.27)
Finding relevant information	3 (1.55)	51 (22.37)	9 (3.78)	73 (26.16)	0 (0.00)	24 (24.49)
Server down problems	3 (1.55)	45 (19.74)	9 (3.78)	73 (26.16)	0 (0.00)	20 (20.41)
Changing in URLs	1 (0.52)	13 (5.70)	7 (2.94)	70 (25.09)	0 (0.00)	9 (9.18)
Lack of assistance by library staff	2 (1.04)	14 (6.14)	9 (3.78)	71 (25.45)	2 (7.14)	10 (10.20)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-13 shows the problems encountered during the use of e-resources by respondents' branches. The majority of respondents who belonged to mechanical engineering face the problem of selecting search terms (38.54%) followed by slow internet connectivity (24.87%) and power failure (21.88%).

The majority of respondents who belonged to electronics and communication encountered the problem of selecting search terms (79.59%) followed by lack of ICT skills (34.69%), slow internet connectivity (29.39%), and power failure (26.53%). The respondents of civil engineering encounter the problem of selecting the search term (62.50%) followed by power failure (41.67%). Meanwhile, the respondents who belonged to computer science face the problem of selecting search terms (43.59%), slow internet speed (26.52%), and finding relevant information as well as the slow server which accounted for 26.16%). The majority of respondents of the biotechnology branch face the problems such as lack of ICT

skills and selection of search terms (25%). Further analysis shows that the majority of respondents who belonged to electrical and electronics faced the problem of selection of search terms (77.27%) followed by inability to use ICT/lack of ICT skills (50%). Overall, the selection of search terms is found to be the major problem encountered by the respondents of all branches of engineering followed by slow internet speed.

Table-14: Preferences given to the category of electronic information resources (EIR) by respondents' branches

Category of EIR	Branches					
	M (N=193)	E&C (N=228)	CE (N=238)	CS (N=279)	BT (N=28)	E&E (N=98)
Freely available resources (Open access)	119 (61.66)	216 (94.74)	183 (76.89)	228 (81.72)	28 (100.00)	94 (95.92)
Resources Subscribed by the college (Paid)	192 (99.48)	209 (91.67)	230 (96.64)	217 (77.78)	28 (100.00)	89 (90.82)
Self subscribed (own subscription)	25 (12.95)	6 (2.63)	5 (2.10)	2 (0.72)	0 (0.00)	5 (5.10)
All the above	24 (12.44)	5 (2.19)	5 (2.10)	1 (0.36)	0 (0.00)	4 (4.08)

M – Mechanical, E&C - Electronics and communication, CE - Civil engineering, CS - Computer science, BT – Biotechnology, E&E - Electrical and Electronics

Table-14 indicates the preferences given to categories of electronic information resources (EIR) by respondents who belonged to different branches of engineering. The majority of respondents of mechanical (99.48%), Civil (96.64%), and Biotechnology (100%) engineering have given preference to the resources subscribed to the college library. Whereas the majority of respondents who belonged to Electronics and Communication (94.74%), Computer Science (81.72%), and Electrical and Electronics (95.92%) engineering have given preferences to open access e-resources. The table indicates that the preference given to library subscribed e-resources, as well as open access e-resources, is higher among the respondents of all branches of engineering.

Table-15: Satisfaction with the infrastructure provided in the library to access Electronic Information resources by respondents' branches

Branches	Satisfied	
	Number	Percentage
Mechanical (N=193)	192	99.48
Electronics and communication (N=228)	218	95.61
Civil engineering (N=238)	236	99.16
Computer science (N=279)	228	81.72
Biotechnology (N=28)	28	100.00

Electrical and Electronics (N=98)	96	97.96
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Table-15 depicts the satisfaction towards infrastructure provided in the library to access Electronic Information resources by the respondents of different branches of engineering. More than 95% of respondents who belonged to Mechanical, Electronics and Communication, Civil, Biotechnology, and Electrical and Electronics have stated that the infrastructure in the library to access EIRs is satisfactory. Meanwhile, 81.72% of respondents who belonged to computer science opined that the infrastructure in the library to access EIRs is satisfactory.

Table-16: Requirement for training to access Electronic Information resources by respondents' branches

Branches	Requirement of training	
	Number	Percentage
Mechanical (N=193)	40	20.73
Electronics and communication (N=228)	79	34.65
Civil engineering (N=238)	5	2.10
Computer science (N=279)	166	59.50
Biotechnology (N=28)	10	35.71
Electrical and Electronics (N=98)	26	26.53

Table-16 shows that the majority of respondents who belonged to computer science (59.50%) opined that they require training to access EIRs followed by the respondents who belonged to Bit-technology (35.71%), Electronics, and Communication (34.65%), and Electrical and Electronics (26.53%). The respondents who belonged to Mechanical (20.73%) and a meager percentage of respondents who belonged to civil engineering (2.10%) have a similar opinion.

6. Discussion and Conclusion

Plenty of electronic resources in various forms are available through the internet. These e-resources are available in almost all branches of knowledge, and engineering science is not an exception. When asked about whether the respondents have used e-sources, it was found that 100% of them use e-resources. The majority of respondents prefer to use e-journals followed by e-books. The wide availability of e-journals and e-books are the reasons that make engineering students use these e-resources heavily than other e-resources.

Meanwhile, the study has witnessed that of the 1064 respondents, the majority of respondents i.e. 462 (43.42%) respondents use e-resources weekly followed by 181 (17.01%) respondents use occasionally, and 138 (12.97%) use library subscribed e-resources 3-4 days a week. However, the libraries need to take initiatives to increase the frequency of using e-resources by offering virtual reference service, routing of e-journal content, orientation programs, special talks, and so on.

E-resources have created many potential avenues for the academic community. The e-resources have been a significant source of information among the student community. The study found that the major purpose of use of e-resources is to study and prepare notes (mean=3.93) followed by to prepare seminar/conference/workshop (mean=3.80), to do research (mean=3.72), and to update knowledge (mean=3.59). Hence, the libraries need to focus to develop a quality collection of e-resources that satisfy the academic and research demands of the engineering students.

The study also found that the students used 'keyword' as the most preferable search approach among the respondents of all branches of engineering. 'Author name', 'DOI', are also used extensively as the search approaches while using electronic information resources. Hence, the librarians need to teach search strategies about accessing e-resources periodically. The study also found that the students prefer to use library subscribed e-resources and open access e-resources. Therefore, it has become inevitable for libraries to depend on library consortium and increased subscription. Perpetual access to e-resources needs to be provided. Interestingly, the VTU consortium is considered to be a well-known gateway used to access e-resources. Since the origin of VTU is Karnataka, the VTU consortium has been a popular platform among the engineering colleges under study which is the highly preferred gateway.

The data also revealed that the satisfaction towards the e-resources is higher among the respondents who belonged to Electronics and Communication (mean=4.10) than other branches of engineering. The respondents who belonged to Biotechnology (mean=3.93), Mechanical engineering (mean=3.72), Computer Science (mean=3.59), Civil engineering (mean=3.46) are nearly satisfied with the subscribed e-resources. The role of libraries and the stakeholder involved in the subscription and dissemination of e-resources is significant in understanding the student demands here. It is also advisable that the libraries need to offer training programs to the needy in accessing e-resources without hazards such as selection of keywords, selection of database, locating the right e-resources, saving the data, and ethical use of saved data.

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