

USE OF WEB-BASED SOURCES AND SERVICES BY PG STUDENTS OF ENGINEERING COLLEGES IN BANGALORE CITY

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The study mainly focused on the use of web-based sources and services by PG students in engineering colleges of Bangalore city. The present study examines the use of electronic information resources and services available via the AICTE-INDEST consortium, use of web-based library services, sources of awareness about electronic information resources, the purpose of use of electronic information resources, benefits of the use of electronic information resources, problems faced while using electronic information resources, preferred search options for searching online information resources, field-based search methods, frequency of use of advance search facilities and to suggest ways and means for enhancing the use of web resources and services by the PG students. For this purpose, the researchers prepared a well-structured questionnaire as a tool for data collection and the collected questionnaire has been analyzed and presented in the form of suitable tables. The article concludes with appropriate suggestions.

Keywords: Web Resources, Electronic Resources, Retrieval Techniques, Online Library Services.

INTRODUCTION

The Information and Communication Technology has brought an evolutionary change in information scenario giving rise to several options to the users' community to handle various information sources conveniently and effortlessly as a result of which web-based electronic resources have become the lively substance to the modern library reserves in satisfying varied needs of students, research scholars and faculty with minimum risk and time. The features of electronic information environment like they provide access to very large information collections including access to primary and complete information, not merely surrogates or indexes, supporting multimedia content, network accessibility, user-friendly interfaces, unique referencing of digital objects, multiple-uses and reference to various areas simultaneously, current information services, advance search, and retrieval, supporting both formal and informal learning, remote access, online discussion and commands, accessibility from anyone,

anywhere, anytime, supporting, the opportunity to publishing, annotation, and integration of new information have made a great impact on students to utilize various forms of electronic information resources and services. The PG students of the engineering colleges are gradually adopting new technologies for satisfying their information needs while carrying out academic activities. The present study was conducted to know the use of web-based sources and services by PG students in engineering colleges of Bangalore city.

REVIEW OF LITERATURE

Many similar studies related to the topic have been reviewed and the literature review gives a broader outlook of it. Some of the important reviews are presented below.

Thanuskodi (2011) examined the usage of electronic resources at Dr. T.P.M. Library, Madurai Kamaraj University. The study revealed that M.Phil. Student respondents took the first position in their overall methods of searching e-resources, postgraduate student respondents the second position, Ph.D. Scholar respondents the last position. The study confirmed that respondents were aware of the e-resources and various types of e-resources, e-database, and e-journals. The study recommended the improvement in the access facilities with high internet speed and subscription to more e-resources at Dr. T.P.M. Library, Madurai Kamaraj University. Awuor et al, 2013 found in their study that the adoption of ICT has revolutionized service provision in libraries and their general information management systems. This has transformed most services to digital: e-database,

e-catalogs, e-library, and the use of archiving technology like DSpace. Today, within the developing world, most libraries are moving towards transforming their existing traditional library services to digital systems allowing them to tap and benefit from the vast advantages of ICT, for example, operation costs reduction, increased efficiency, and on-the-fly availability of information. Even with such numerous benefits, most Higher Institutions of Learning in developing countries still lag on the adoption of ICT in their library services. Ramamurthy et al., 2015 investigated the knowledge of information literacy and search skills of students in five selected Engineering Colleges in Chittoor District, Andhra Pradesh. It was found that the preponderance of respondents have low knowledge of information literacy skills, showed high deficiency in identifying diverse information sources. The various information literacy programs to the respondents in institutions lacked hands-on training. Thus, the need for an enhanced and continuous library user education geared towards empowering students to be sufficiently familiar with information sources.

Baikady et al., (2011) explored the use of web resources in learning, teaching, clinical practice, and patient care and found that users prefer web-based resources over traditional libraries and users perceive that the web contains exhaustive information and is easy to use. Baskaran⁴ revealed that maximum use of library is by faculty of science particularly scientific e-journals for preparing seminars, conferences and other assignments. Sampath Kumar, and Kumar, 2010 found, in his study of medical and

management colleges in Bangalore that the users are well aware of e-resources and refer to use the internet. Mwantimwa et al., (2021) compared resources usage by academic staff and researchers across universities in Tanzania and found a difference in access to and usage of e-resources for supporting teaching and research activities among the universities involved. The findings further indicate that open access resources are significantly used for teaching and research purposes, more so than the subscribed resources. Inability to access full-text articles, inadequate searching skills, and slow Internet speed were the main challenges reported to undermine effective access to and use of e-resources.

OBJECTIVES OF THE STUDY

The objectives for conducting the present study are:

1. To know the existing web-based sources and services in the engineering colleges of Bangalore city.
2. To assess the use pattern of web information by the PG students in engineering colleges of Bangalore city.
3. To identify the purpose of use of web information by PG students.
4. To identify the search method adopted by the PG students.
5. To know the problems faced by the PG students in using web based electronic information resources.
6. To suggest measures to improve the use of web-based information resources and services.

SCOPE AND LIMITATIONS OF THE STUDY

The scope of the study is restricted to use of web-based sources and services by PG students in engineering colleges of Bangalore City in Karnataka State.

METHODOLOGY

The survey method was adopted, using questionnaire as a tool for data collection. A structured questionnaire was designed and distributed among postgraduate Engineering Colleges of Bangalore City. Out of 2708 questionnaires distributed among MTech Students, 2384 filled in questionnaires were received back amounting to 88.03%. In addition to the questionnaire method, interview schedule was also used to collect required information as a supplement to the questionnaire method to bring more clarity to the data which are essential and used for analysis and interpretation of data.

DATA ANALYSIS

The data was collected by different methods were analyzed and interpreted and the same is presented in the following tables.

Distribution of the Questionnaires

All the branches of Engineering have been covered by six parent disciplines/ clusters viz. Civil Engineering, Mechanical Engineering, Electrical Engineering, Computer Science Engineering, Electronics, and Communication Engineering and Biotechnology Engineering. Table-1 given below presents the details of questionnaires administered and responses received by the PG students in engineering colleges in Bangalore city.

The Table 1 exhibits that 2708 questionnaires were administered in total to PG Students in engineering colleges against which 2384 responses were received, thus bringing overall responses to 88.03%. The number of questionnaires administered varies from discipline to discipline as the questionnaires administered are based on the number of students studying in respective disciplines. Thus, the number of questionnaires administered in the Computer Science and Engineering discipline is more as the total student's strength in this

discipline is more. So also the number of questionnaires administered is less in the Biotechnology and Engineering discipline as the total students studying Biotechnology and Engineering are less compared to all other disciplines. It may be observed that the discipline wise percentage of responses vary between 83.87% and 92.71%, the lowest response rate being from students of Mechanical Engineering and the highest percentage of response being from students of Electrical and Computer Engineering discipline.

Table 1: Distribution of the Questionnaires

Disciplines	Questionnaires Administered	Questionnaires Received	
		Number	Percentage
Civil Engg.	469	398	84.86
Mech. Engg.	521	437	83.87
Elect. Engg.	407	345	84.76
Comp. Sci. Engg.	608	554	91.11
Elec. & Com. Engg	535	496	92.71
Biotech. Engg.	168	154	91.66
Total	2708	2384	88.03

Gender Wise Distribution of Respondents

The gender wise distribution of responses received from the students has been summarized in Table-2. Table-2 shows that of the 2384 total students, 1398 (58.65%) is 'Male' and the remaining 986 (41.35%) are 'Female'.

Table 2: Gender Wise Distribution

Gender	Number (N=2384)	Percentage
Male	1398	58.65
Female	986	41.35
Total	2384	100.00

Experience of internet users

The information gathered from the students about their experience of use of the internet has been summarized in Table-3. About 1093 (45.85%) of students have experience of '7-9 years' with the mean value of 3.1976 and SD 1.4271, followed by 811 (34.02%) of students have experience of '3-6 years' with mean value 3.1344 and SD 1.4700, 463 (19.42%) of students have experience of 'Above 09 years' with mean value 3.9568 and SD 1.1675. About 17 (00.71%) of students have experience of 'Less than 3 years with mean value 3.4117 and SD 1.9711.

Table 3: Experience of Internet users

Period	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)	Mean	SD
Less than 3 years	06 (01.51)	02 (00.46)	01 (00.29)	00 (00.00)	03 (00.60)	05 (03.25)	17 (00.71)	3.4117	1.9711
3 to 6 years	142 (35.68)	211 (48.28)	119 (34.49)	110 (19.86)	193 (38.91)	36 (23.38)	811 (34.02)	3.1344	1.4700
7 to 9 years	216 (54.27)	195 (44.62)	177 (51.30)	248 (44.77)	176 (35.48)	81 (52.60)	1093 (45.85)	3.1976	1.4271
Above 9 years	34 (08.54)	29 (06.64)	48 (13.91)	196 (35.38)	124 (25.00)	32 (20.78)	463 (19.42)	3.9568	1.1675
Note: Figures in parentheses indicate the percentage $\chi^2=259.448$, $df=15$, $P=0.00$									

Use of Electronic Information Resources

The use of various types of electronic information resources by the students has been summarized in Table 4. About 2341(98.20%) of students use e-teaching materials, followed by 2061 (86.46%) of students use e-journals, 1732 (72.65%) e-thesis and dissertations, 1633

(68.50%) e-books, 1436 (60.24%) e-tutorials, 1404 (58.89%) e-technical reports, 1244 (52.19%) e-databases, 798 (33.48%) e-conference proceedings, 786 (32.96%) subject gateways/ e-portals and 673 (28.23%) of students use e-patents.

Table 4: Use of Electronic Information Resources

Electronic Information Resources	Total (N=2384)	Percentage (%)
E-Journals	2061	86.46
E-Books	1633	68.50
E-Technical Reports	1404	58.89
E-Conference Proceedings	798	33.48
E-Teaching Materials	2341	98.20
E-Tutorials	1436	60.24
E- Databases	1244	52.19
E- Thesis and Dissertations	1732	72.65
E- Patents	673	28.23
Subject Gateways / E-portals	786	32.96

Use of Electronic Information Resources and Services of AICTE-INDEST Consortium

Out of total of 2384 respondents, 2255 are aware of the following Electronic Information Resources and Services as detailed in the above Table. Therefore, Table-5 presents responses of

these 2255 students about the frequency of use of electronic information resources and services. About 770 (34.15%) of students not at all use ASTM Digital Library and 624 (27.67%) use it occasionally, followed by 806 (35.74%) of students occasionally use ASCE, 774 (34.32%)

Table 5: Use of Electronic Information Resources and Services of AICTE-INDEST Consortium

VTU consortia-based e-resources	Responses (N=2255)				
	Most Frequently	Frequently	Less frequently	Occasionally	Not at all
ASTM Digital Library	196 (08.69)	301 (13.35)	364 (16.14)	624 (27.67)	770 (34.15)
ASCE (American Society of Civil Engineers)	210 (09.31)	403 (17.87)	428 (18.98)	806 (35.74)	408 (18.09)
ASME (American Society of Mechanical Engineers)	304 (13.48)	374 (16.59)	366 (16.23)	774 (34.32)	437 (19.38)
Gale Cengage Taylor & Francis Learning	260 (11.53)	388 (17.21)	343 (15.21)	899 (39.87)	365 (16.19)
Taylor and Francis	143 (06.34)	262 (11.62)	498 (22.08)	846 (37.52)	509 (22.57)
IEEE / IEL online	535 (23.73)	497 (22.04)	512 (22.71)	365 (16.19)	346 (15.34)
J-Gate	211 (09.36)	368 (16.32)	467 (20.71)	825 (36.59)	384 (17.03)
Springer	336 (14.90)	461 (20.44)	596 (26.43)	670 (29.71)	192 (08.51)
McGraw-Hill	139 (06.16)	458 (20.31)	603 (26.74)	591 (26.21)	464 (20.58)
Science Direct	216 (09.58)	391 (17.34)	563 (24.97)	664 (29.45)	421 (18.67)
Elsevier	223 (09.89)	404 (17.92)	459 (20.35)	783 (34.72)	386 (17.12)
Institution of Civil Engineers (ICE)	346 (15.34)	294 (13.04)	253 (11.22)	699 (31.00)	663 (29.40)
Emerald	227 (10.07)	381 (16.90)	306 (13.57)	724 (32.11)	617 (27.36)
New Age International	202 (08.96)	260 (11.53)	684 (30.33)	613 (27.18)	496 (22.00)
Packt	192 (08.51)	164 (07.27)	231 (10.24)	794 (35.21)	874 (38.76)
K-Nimbus Digital Library	294 (13.04)	301 (13.35)	612 (27.14)	560 (24.83)	488 (21.64)
NetAnalytiks	329 (14.59)	364 (16.14)	421 (18.67)	448 (19.87)	693 (30.73)
Proquest	385 (17.07)	316 (14.01)	309 (13.70)	759 (33.66)	486 (21.55)
Whiley Blackwell	204 (09.05)	471 (20.89)	612 (27.14)	607 (26.92)	361 (16.01)
EBSCO	280 (12.42)	219 (09.71)	627 (27.80)	745 (33.04)	384 (17.03)

Note: Figures in parentheses indicate the percentage.

of students occasionally use ASME, 899 (39.87%) of students occasionally use Gale Cengage Taylor & Francis Learning, 846 (37.52%) of students occasionally use Taylor and Francis, 535 (23.73%) of students most frequently use IEEE/ IEL Online, 825 (36.59%) of students occasionally use J-Gate, 603 (26.74%) of students less frequently use McGraw-Hill, 670 (29.71%) of students use occasionally use Springer, 664 (29.45%) of students occasionally use Science Direct, 783 (34.72%) of students occasionally use Elsevier, 699 (31.00%) of students occasionally use Institution of Civil Engineers, 724 (32.11%) of students occasionally use Emerald, 684 (30.33%) of students less frequently use New Age International, 874 (38.76%) of students not at

all use Packt and 794 (35.21%) use occasionally. About 612 (27.14%) of students less frequently use K-Nimbus Digital Library, 693 (30.73%) of students not at all use NetAnalytiks and 448 (19.87%) of students use occasionally. About 759 (33.66%) of students occasionally use Proquest, 612 (27.14%) of students less frequently use Wiley Blackwell and 745 (33.04%) of students occasionally use EBSCO.

Use of Web Based Library Services

The use of web-based library resources by the students has been summarized in Table-6. About 1899 (79.66%) of students use Library Webpage/ Website, followed by 1775 (74.45%) Virtual reference desk/Ask-a-librarian, 1679 (70.43%) web OPAC, 1597 (66.99%) Web-based

Table 6: Use of Web Based Library Services

Library Services	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)
Electronic document delivery service	184 (46.23)	255 (58.35)	217 (62.90)	347 (62.64)	312 (62.90)	96 (62.34)	1411 (59.19)
Electronic current awareness service	216 (54.27)	264 (60.41)	204 (59.13)	361 (65.16)	296 (59.68)	109 (70.78)	1450 (60.82)
Electronic SDI services	74 (18.59)	120 (27.46)	162 (46.96)	298 (53.79)	244 (49.19)	82 (53.25)	980 (41.11)
Web-based reference tools	198 (49.75)	284 (64.99)	280 (81.16)	402 (72.56)	309 (62.30)	124 (80.52)	1597 (66.99)
Virtual reference desk/Ask-a-librarian	241 (60.55)	339 (77.57)	299 (86.67)	396 (71.48)	384 (77.42)	116 (75.32)	1775 (74.45)
Library Webpage/ Website	286 (71.86)	361 (82.61)	314 (91.01)	442 (79.78)	391 (78.83)	105 (68.18)	1899 (79.66)
Web OPAC	244 (61.31)	356 (81.46)	239 (69.28)	412 (74.37)	352 (70.97)	76 (49.35)	1679 (70.43)
Bulletin Board	106 (26.63)	84 (19.22)	104 (30.14)	149 (26.90)	102 (20.56)	68 (44.16)	613 (25.71)
Article alert service	124 (31.16)	104 (23.80)	122 (35.36)	164 (29.60)	144 (29.03)	71 (46.10)	729 (30.58)
Library blogs	34 (08.54)	53 (12.13)	93 (26.96)	210 (37.91)	106 (21.37)	52 (33.77)	548 (22.99)
Note: Figures in parentheses indicate the percentage.							
2=273.122, df=45, P=0.00							

reference tools, 1450 (60.82%) Electronic current awareness service, 1411 (59.19%) Electronic document delivery service, 980 (41.11%) Electronic SDI services, 729 (30.58%) articles alert service, 613 (25.71%) bulletin board and 548 (22.99%) of students use Library blogs.

Sources of Awareness about Electronic Information Resources

The Engineering students become aware of the availability of e-resources from various sources. What are the ways and means through which these students become aware of Electronic

Information Resources are indicated in Table 7. About 1978 (82.96%) of students become aware of newly available electronic resources by personal communication with friends, subject experts, and resource persons, followed by 1578 (66.19%) serendipity, browsing or looking for materials, 1575 (66.06%) cited in report/journals/conference papers, 1569 (65.81%) referred by the librarian, 1423 (59.69%) announcements in journals, 1417 (59.44%) bibliographical database searching and 842 (35.32%) e-mail alerts from publishers/distributors.

Table 7: Sources of Awareness about Electronic Information Resources

Sources of Awareness	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)
Bibliographical Database Searching	201 (50.50)	186 (42.56)	291 (84.35)	342 (61.73)	301 (60.69)	96 (62.34)	1417 (59.44)
Announcements in Journals	164 (41.21)	180 (41.19)	305 (88.41)	366 (66.06)	298 (60.08)	110 (71.43)	1423 (59.69)
Cited in report/journals/conference papers	117 (29.40)	293 (67.05)	301 (87.25)	355 (64.07)	394 (79.44)	115 (74.68)	1575 (66.06)
Referred to me by the librarian	229 (57.54)	324 (74.14)	269 (77.97)	344 (62.09)	301 (60.69)	102 (66.23)	1569 (65.81)
By serendipity, by browsing or looking for materials	188 (47.24)	311 (71.17)	274 (79.42)	385 (69.49)	296 (59.68)	124 (80.52)	1578 (66.19)
E-mail alerts from publishers/Distributors etc.	102 (25.63)	143 (32.72)	136 (39.42)	192 (34.66)	186 (37.50)	83 (53.90)	842 (35.32)
By personal communication with friends, subject experts, and resource persons	304 (76.38)	298 (68.19)	263 (76.23)	521 (94.04)	463 (93.35)	129 (83.77)	1978 (82.96)
Note: Figures in parentheses indicate the percentage.							
2=197.819, df=30, P=0.00							

Purpose of Use of Electronic Information Resources

The purpose of the use of Electronic Information Resources by the students has been summarized in the Table-8. About 1976 (82.89%) of students use electronic resources for the purpose of 'Preparing/ accessing teaching materials', followed by 1969 (82.59%) for preparation for Seminars, conferences and

workshop, 1885 (79.07%) for collecting general information, 1827 (76.64%) for writing assignments, 1696 (71.14%) to access audio/ visual materials, 1663 (69.76%) reading/ writing research papers, 1644 (68.96%) reading research proposal, reports and projects and 1260 (52.85%) of students use electronic resources for the purpose of basic scientific and technical information.

Table 8: Purposes of Use of Electronic Information Resources

Purposes	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)
Reading/ Writing research papers	304 (76.38)	346 (79.18)	270 (78.26)	362 (65.34)	309 (62.30)	72 (46.75)	1663 (69.76)
Reading research proposal, reports and projects	286 (71.86)	304 (69.57)	295 (85.51)	389 (70.22)	284 (57.26)	86 (55.84)	1644 (68.96)
Preparation for Seminars, conference and workshop	314 (78.89)	396 (90.62)	286 (82.90)	484 (87.36)	386 (77.82)	103 (66.88)	1969 (82.59)
Preparing/ accessing teaching materials	296 (74.37)	343 (78.49)	308 (89.28)	506 (91.34)	391 (78.83)	132 (85.71)	1976 (82.89)
Writing Assignments	263 (66.08)	362 (82.84)	301 (87.25)	412 (74.37)	362 (72.98)	127 (82.47)	1827 (76.64)
For basic scientific and technical information	183 (45.98)	243 (55.61)	164 (47.54)	386 (69.68)	203 (40.93)	81 (52.60)	1260 (52.85)
For collecting general information	302 (75.88)	391 (89.47)	285 (82.61)	401 (72.38)	384 (77.42)	122 (79.22)	1885 (79.07)
To access audio/ visual materials	184 (46.23)	360 (82.38)	263 (76.23)	428 (77.26)	358 (72.18)	103 (66.88)	1696 (71.14)
Note: Figures in parentheses indicate the percentage.							
$\chi^2=133.39$, $df=35$, $P=0.00$							

Benefits of Use of Electronic Information Resources

The benefits that the students get due to accessing and using Electronic Information Resources have been summarized and presented in the form of Table-9. About 2037 (85.44%) of students opine electronic information resources as 'Better source of information, followed by

2019 (84.69%) Access to up-to-date information, 1954 (81.96%) 24/7 access to electronic resources, 1953 (81.92%) Time saving, 1907 (79.99%) Improvement in the quality of professional work, 1769 (74.20%) Easily portability of e-resources and 1624 (68.12%) of students are benefited because the information was available in various formats as per the need.

Table 9: Benefits of Using Electronic Information Resources

Benefits	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)
Access to up-to-date information	326 (81.91)	341 (78.03)	308 (89.28)	482 (87.00)	438 (88.31)	124 (80.52)	2019 (84.69)
Time saving	334 (83.92)	392 (89.70)	314 (91.01)	419 (75.63)	396 (79.84)	98 (63.64)	1953 (81.92)
Better source of information	318 (79.90)	326 (74.60)	324 (93.91)	486 (87.73)	441 (88.91)	142 (92.21)	2037 (85.44)
Improvement in the quality of professional work	286 (71.86)	381 (87.19)	306 (88.70)	412 (74.37)	406 (81.85)	116 (75.32)	1907 (79.99)
Information available in various formats as per the need.	241 (60.55)	286 (65.45)	214 (62.03)	389 (70.22)	392 (79.03)	102 (66.23)	1624 (68.12)
24/7 access to electronic resources	319 (80.15)	398 (91.08)	296 (85.80)	435 (78.52)	398 (80.24)	108 (70.13)	1954 (81.96)
Easily portability of e-resources	302 (75.88)	329 (75.29)	281 (81.45)	394 (71.12)	372 (75.00)	91 (59.09)	1769 (74.20)
Note: Figures in parentheses indicate percentage.							
$\chi^2=55.285$, $df=30$, $P=0.00329534$							

Problems Faced While Using Electronic Information Resources

The problems faced while using electronic information resources by the students have been

summarized in Table-10. About 757 (31.75%) of students opine as 'Yes' i.e., they face problems while using electronic information resources and 1627 (68.25%) of students opine as 'No'.

Table 10: Problems Faced While Using Electronic Information Resources

Opinion	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)
Yes	108 (27.14)	182 (41.65)	134 (38.84)	126 (22.74)	151 (30.44)	56 (36.36)	757 (31.75)
No	290 (72.86)	255 (58.35)	211 (61.16)	428 (77.26)	345 (69.56)	98 (63.64)	1627 (68.25)
Note: Figures in parentheses indicate the percentage.							
$\chi^2=54.309$, $df=05$, $P=0.00$							

Types of Problems Faced Using Electronic Information Resources

The types of problems faced using electronic information resources by the students have been summarized in Table-11. About 549 (72.52%) of students face Low Internet bandwidth problems while using electronic information resources, followed by 571 (75.43%) face problems due to Retrieval of irrelevant/ junk information, 326

(43.06%) Unorganized information content, 310 (40.95%) Frequent power failure, 286 (37.78%) Server down or system problem, 211 (27.87%) Unfamiliar file formats, 187 (24.70%) Change of the content/ information, 161 (21.27%) Change in URL and 138 (18.23%) of students face problem due to lack of assistance from library staff.

Table 11: Types of Problems Faced Using Electronic Information Resources

Type of Problems Faced	Civil Engg. (N=108)	Mech. Engg. (N=182)	Elect. Engg. (N=134)	Comp. Sci. Engg. (N=126)	Elec. & Com. Engg. (N=151)	Biotech. Engg. (N=56)	Total (N=757)
Low Internet bandwidth	89 (82.41)	151 (82.97)	103 (76.87)	69 (54.76)	98 (64.90)	39 (69.64)	549 (72.52)
Retrieval of irrelevant/ junk information	93 (86.11)	126 (69.23)	112 (83.58)	84 (66.67)	123 (81.46)	33 (58.93)	571 (75.43)
Frequent power failure	72 (66.67)	84 (46.15)	62 (46.27)	23 (18.25)	51 (33.77)	18 (32.14)	310 (40.95)
Server down or system problem	81 (75.00)	61 (33.52)	50 (37.31)	34 (26.98)	38 (25.17)	22 (39.29)	286 (37.78)
Unfamiliar file formats	56 (51.85)	32 (17.58)	34 (25.37)	12 (9.52)	49 (32.45)	28 (50.00)	211 (27.87)
Change in URL	41 (37.96)	19 (10.44)	26 (19.40)	21 (16.67)	30 (19.87)	24 (42.86)	161 (21.27)
Change of the content/ information	52 (48.15)	29 (15.93)	32 (23.88)	19 (15.08)	38 (25.17)	17 (30.36)	187 (24.70)
Unorganized information content	73 (67.59)	52 (28.57)	44 (32.84)	87 (69.05)	46 (30.46)	24 (42.86)	326 (43.06)
Lack of assistance from library staff	34 (31.48)	21 (11.54)	18 (13.43)	23 (18.25)	29 (19.21)	13 (23.21)	138 (18.23)
Note: Figures in parentheses indicate the percentage							
2=174.655, df=40, P=0.00							

Preferred Search Options for Searching Online Information Resources

The preferred search options for searching online information resources by the students have been summarized in Table-12. About 882 (37.00%) of students prefer Basic/Simple Search

with Mean 3.2403 and SD 1.4201. About 775 (32.51%) of students prefer both i.e. Basic and Advance Search options with Mean of 3.3532 and SD 1.4995. About 727 (30.49%) of students prefer the Advance Search option to search online information resources with Mean 3.3658 and SD 1.3786.

Table 12: Preferred Search Options for Searching Online Information Resources

Preferred Search Options	Civil Engg. (N=398)	Mech. Engg. (N=437)	Elect. Engg. (N=345)	Comp. Sci. Engg. (N=554)	Elec. & Com. Engg. (N=496)	Biotech. Engg. (N=154)	Total (N=2384)	Mean	SD
Basic / Simple search	141 (35.43)	183 (41.88)	208 (60.29)	92 (16.61)	189 (38.10)	69 (44.81)	882 (37.00)	3.2403	1.4201
Advance search	108 (27.14)	126 (28.83)	78 (22.61)	246 (44.40)	145 (29.23)	24 (15.58)	727 (30.49)	3.3658	1.3786
Both	149 (37.44)	128 (29.29)	59 (17.10)	216 (38.99)	162 (32.66)	61 (39.61)	775 (32.51)	3.3832	1.4995
Note: Figures in parentheses indicate percentage.									
2=213.28, df=10, P=0.00									

Field Based Search Methods

The information gathered about field-based search methods by the students has been summarized in Table-13. About 1261 (52.89%) of students use ‘Author’ field based search ‘Most Frequently’, followed by 1128 (47.32%) of

students use ‘Title’ field based search ‘Most Frequently’, 924 (38.76%) of students use ‘Subject’ field based search ‘Most Frequently’, 1208 (50.67%) of students use ‘Keywords’ field based search ‘Most Frequently’, 695 (29.15%) of students use ‘Publisher’ field based search

Table 13: Field Based Search Methods

Field Based Search Methods	Responses (N=2384)				
	MF	F	LF	U	DU
Author	1261 (52.89)	547 (22.94)	304 (12.75)	223 (09.35)	49 (02.06)
Title	1128 (47.32)	808 (33.89)	246 (10.32)	169 (07.09)	33 (01.38)
Subject	924 (38.76)	762 (31.96)	354 (14.85)	204 (08.56)	140 (05.87)
Keywords	1208 (50.67)	503 (21.10)	344 (14.43)	301 (12.63)	28 (01.17)
Publisher	182 (07.63)	401 (16.82)	695 (29.15)	664 (27.85)	442 (18.54)
Author address	208 (08.72)	545 (22.86)	746 (31.29)	521 (21.85)	364 (15.27)
Abstract	544 (22.82)	416 (17.45)	502 (21.06)	626 (26.26)	286 (12.00)
Keywords/Title/Abstract	608 (25.50)	717 (30.08)	598 (25.08)	389 (16.32)	72 (03.02)
5- (MF)Most Frequently, 4- (F)Frequently, 3-(LF) Less Frequently, 2- (U)Uncertain, 1- (DU)Do not Use					
Note: Figures in parentheses indicate the percentage.					
2=4323.036, df=28, P=0.00					

‘Less Frequently’, 746 (31.29%) of students use ‘Author Address’ field based search ‘Less Frequently’, 626 (26.26%) of students use ‘Abstract’ field based search ‘Uncertain’ and 717 (30.08%) of students use ‘Keywords/Title/Abstract’ field based search ‘Frequently’.

Frequency of Use of Advance Search Facilities

The frequency of use of advance search facilities by the students has been summarized in

Table-14. About 708 (29.70%) of students use Boolean Search ‘Less Frequently’, 890 (37.33%) of students use ‘Do not use’ Truncation/ wildcard search, 886 (37.16%) of students use field-based search ‘Less Frequently’, 1153 (48.36%) of students use Phrase search ‘Most Frequently’ and 748 (31.38%) of students use ‘Digital Object Identifier’ to ‘Less Frequently’.

Table 14: Frequency of Use of Advance Search Facilities

Usage of advance search facilities	Responses (N=2384)				
	MF	F	LF	U	DU
Boolean Search (AND, OR, NOT)	547 (22.94)	496 (20.81)	708 (29.70)	391 (16.40)	242 (10.15)
Truncation/ wildcard search (* and ?)	228 (09.56)	174 (07.30)	294 (12.33)	798 (33.47)	890 (37.33)
Field based search (Eg.: “Chemistry”)	591 (24.79)	460 (19.30)	886 (37.16)	304 (12.75)	143 (06.00)
Phrases search (Eg.: “Use of online resources”)	1153 (48.36)	684 (28.69)	356 (14.93)	132 (05.54)	59 (02.47)
Digital Object Identifier	529 (22.19)	463 (19.42)	748 (31.38)	308 (12.92)	336 (14.09)
5- Most Frequently, 4- Frequently, 3- Less Frequently, 2- Uncertain, 1-Do not use					
Note: Figures in parentheses indicate the percentage.					
2=3407.776, df=16, P=0.00					

CONCLUSION

This study provided an insight into the use of web-based sources and services by PG students in engineering colleges of Bangalore city in Karnataka State. The ICT enables resources and services made available via the internet has become an inseparable part of today’s educational system. Due to advancement in the area of the Internet and Information Technology, a large amount of educational resources are being produced, distributed and accessed in the

electronic format. The dependency on internet-based services is increasing every day and users of engineering institutions are depending more on information resources available through the internet to meet their academic needs. The students should become much familiar with latest search techniques for better utilization of available web resources.

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