GREY LITERATURE IN ENGINEERING SCIENCES AND TECHNOLOGY AND ITS USE PATTERN IN THE RESEARCH INSTITUTIONS IN INDIA: THE CASE STUDY OF KARNATAKA STATE.

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ABSTRACT

[The paper is based on the survey research undertaken during 2008-2010. The availability of GL collections and its use pattern in the Recognised Research Centres of Visvesvaraya Technological University (VTU) have been analysed on the basis of the responses of the librarians and the personal observation of the situation in the libraries. A detailed attempt is also made to capture the responses of the users on the use pattern of GL. The users constitute the faculty members engaged in supervising the research programmes, and the research scholars who have registered for doctoral research. The extent of the use of the 6 types of conventional form of GL: theses, dissertations, institutional publications, trade literature, technical reports and proceedings of conferences, seminars and workshops have been studied.

Further, the research covers aspects involved in building need based GL collections. Habits of the faculty in visualizing the recent releases of GL and the trends in exploiting the GL collections of the local and regional libraries have been depicted. The research suggests for the creation of databases of GL, resource sharing and development of digital repositories of theses and proceedings of conferences and seminars, for which increased demand is noticed from the user community. The study also captures the training needs of the working librarians and the user community for better access and use of GL .]

[KEY WORDS: Grey Literature, Use Pattern; GL, Resource Sharing; GL, Engineering Sciences; GL, Orientation Programme.]

1. Introduction : The grey literature has a great significance in supporting on going academic and research initiatives especially, in the disciplines of engineering sciences and technology. It is produced mainly by researchers and practitioners, in fact more quickly, more detailed with greater flexibility than white literature. Grey literature includes standards, specifications, technical notes, conference proceedings, patents, trade literature, work manuals, work flow-charts, institutional reports, plans and lay-outs and the term "Grey" in the professional environment is "unconventional" "informal" "informally published" "fugitive" and even "invisible". Auger (1998, p.3) includes in the purview, reports, technical notes, theses, trade literature, preprints etc. In his definition all of which are characterized by: poor bibliographic control and information; low print runs and a non-professional layout and format; difficult to obtain, as they are not available through normal book selling channels.

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2. Scope of the Study: The literature study reveals that till now no study has been done on grey literature available in engineering colleges in India. The way they are organized to facilitate easy access, and to what extent users are using these resources, though significant, are yet to be understood. The study also unfolds the use pattern of GL which will help to find new approaches for facilitating better access to the grey materials. The study focuses on the six categories of printed grey literature available in the holdings of these Recognised Research Centres in the State of Karnataka : theses, dissertations, institutional publications, trade literature, technical reports and proceedings of conferences, seminars and workshops.

Theses : Researchers and scholars in the academic institutions and universities take up research programmes and finally come out with the research reports / theses for the award of doctoral degrees. These reports constitute unpublished sources of primary information and become property of the universities. Theses are considered to be vital as they carry in depth studies indicating objectives, methodology, hypotheses, and findings of research encompassing up-to-date statistical data, citations and information pertaining to the narrow field of study. Theses are valuable because they are original studies, and subject to strict review.

Dissertations : By and large, master's degree students take-up minor research projects as part fulfillment of their degree programmes and submit the dissertations to the academic institutions. Studies in dissertations cover small area, involving limited population samples, and the research work gets completed within the stipulated semester period. Dissertations cover all issues such as methodology, scope and findings of research, including up-to-date reading list, usually useful in case of similar project works.

Institution Publications: Every institution, whether academic or research brings out number of in-house publications for internal circulation and reference. Annual reports, budget reports, academic progress reports, quality assessment reports, audit reports, reports covering academic and research programmes, including extension programmes and publications covering infrastructure development, human resource development, and training facility fall into this category. The institution publications form vital source of information giving details on the background/historical development of the institution. Usually, scholars working in the same institution access them for facts and figures.

Trade literature : Manufacturing and service sectors bring-out regularly the publications in the form of book-lets, catalogues, brochures and guides. They cover various products and services of industries, laboratories and manufacturers giving specific details pertaining to models, components, prices, warranty, mode of delivery and so forth. Users refer to these literature to know the latest products, composition, models and prices.

Technical Reports : Industrial and research institutions regularly bring-out report literature which carry experimental procedure, production data, operating plans, flow-charts, drawings, mainly dealing with technological specifications useful for engineers and technologists. By and large, research organizations prepare technical reports as their out come of research activities, addressing a particular problem. Technical reports are usually very rich in experimental detail according to the MAGiC Project (Needham, 2002, p.20). Sometimes, institutions apply colour coding for easy identification and circulation and immediate reference. Technical reports are the most valuable source of grey literature useful for research and development in any given field.

Proceedings of Conferences, Seminars and Workshops : Academicians and scientists belonging to a particular discipline come together on a common platform to discuss and deliberate on a particular subject and come-out with recommendations. Before/after the conferences or seminars usually the professional bodies/societies/associations bring out the proceedings. The proceedings carry research articles covering up-to-date data and information, contributed by many scholars and hence, form very useful tool to know the current trends and developments (Ramadevi, 2006,pp.53-54). Proceedings of the workshops gives practical details and step-by-step guidelines usually circulated among the participants before the conduct of practical orientation or training sessions, emphasizing mainly on hands-on experience.

3. Objectives :
- To know the availability of grey literature in the engineering institutions.
- To assess the use pattern of grey literature by the faculty supervisors and research scholars and further, to suggest methods to be adopted for facilitating easy access.
- To know the extent of sharing of the GL collections of regional libraries.To comprehend the training requirements of the librarians and users for better access and use of grey literature

4. Methodology : The study began with a detailed and extensive literature search. Considering the availability of the infrastructure facility and the qualified faculty, 65 engineering colleges have been identified for research programmes out of 171 engineering colleges. The primary data relating to the availability and organization of grey literature in the libraries of the Recognised Research Centres have been collected through questionnaire from the librarians. The researcher also visited all these centres and observed the grey collection and its organisation. After having received the filled in questionnaires, the data was tabulated and analysed. The second questionnaire was designed and administered to all the users, the faculty members who are engaged in supervising the doctoral programmes and the research scholars who have registered for Ph.D programme. The data thus obtained through the questionnaires have been analysed in the light of the objectives. The entire population covered in the study is 930 research scholars and 340 faculty guides. The percentage of total users covered in the study is 84.6.

In India, the All India Council for Technical Education (AICTE) has taken initiative in providing access to scholarly publications, including the digital information resources to the engineering colleges and research institutions. The Indian National Digital Library in Engineering Sciences and Technology (INDEST), popularly known as INDEST-AICTE Consortium, in association with the University Grants Commission (UGC) is entrusted with the task of meeting the information requirements of the research community. In the State of Karnataka, there are 171 engineering colleges. Out of which, excluding industrial establishments, 65 colleges are recognized as research centres.

5. Collection of GL and its Use Pattern.

Below table furnishes statistics of GL collection. As submission of dissertations is a part of master's degree programme and mandatory for the post-graduate students, the total holding of dissertations in the libraries is 79845. Many libraries have got a good collection of dissertations, proceedings of CSW and technical reports.

Table 1: Total collection of GL in the libraries

Sl.No.	Types of GL	Total Collection
1	Theses	793
2	Dissertations	79845
3	Institutional publications	9499
4	Trade literature	3021
5	Technical reports	22181
6	Proceedings of CSW	16456
	Total	**131795**

The trade literature collection is quite small. As the research programme has been initiated recently by VTU, there are just 793 theses volumes in the holdings of these libraries. Many of the theses volumes before 2003 were submitted to various universities of the state. Further, some of the libraries do not have complete collection of their own college. Engineering colleges have to make it mandatory to send one or more copies of their publications to their libraries so that comprehensive collection can be accessed in the libraries without any gaps. College publications include annual reports, budget reports, progress reports, calendar of events, development review reports, quality monitoring reports, details of facilities and services, college handbooks, guides, brochures and manuals. Acquisition policy, collection development policy in the engineering colleges has to be evolved with action plan to build-up GL collection. A survey of users has to be conducted on the use of GL to identify the area and specific documents required for various academic and research programmes.

It is clear from the below table that the GL in all the govt. College libraries is easily accessible without any difficulty. In the Aided college, 88.9% of the libraries have kept GL at vantage points facilitating easy access.

Table 2:GL kept at vantage points and easily accessible

Sl. No.	Extent of Easy Access	Govt. Colleges		Aided Colleges		Private Colleges		Total	
1	Most easily accessible (100%)	5	83.3%	3	33.3%	26	52.0%	34	52.3
2	Easily accessible (75%)	1	16.7%	5	55.6%	18	36.0%	24	36.92
3	Moderately easy to access (50%)	Nil	Nil	1	11.1%	5	10.0%	6	9.2
4	Difficult to access (25%)	Nil	Nil	Nil	Nil	1	2.0%	1	1.5
	Total	6	100	9	100	50	100	65	100

As regards private college libraries, 88% of the libraries facilitate easy access to the GL. Considering the 65 colleges recognized for research, a large majority of the libraries representing 89.2% have kept GL at vantage points so that the users can access easily

Table 3 : Extent of dependency of librarians on other libraries for GL

S. No.	Types of GL	Extent of Dependency					Total
		100%	**75%**	**50%**	**25%**	**Nil**	
1	Theses	5 7.7%	13 20.0%	16 24.6%	21 32.3%	10 15.4%	65 100%
2	Dissertations	3 4.6%	15 23.1%	18 27.7%	22 33.8%	7 10.8%	65 100%
3	Institutional publications	3 4.6%	13 20.0%	15 23.1%	23 35.4%	11 16.9%	65 1005
4.	Trade literature	3 4.6%	11 16.9%	17 26.2%	19 29.2%	15 23.0%	65 100%
5.	Technical reports	5 7.7%	7 10.8%	24 36.9%	22 33.8%	7 10.8%	65 100%
6.	Proceedings of CSW	3 4.6%	12 18.5%	19 29.2%	23 35.4%	8 12.3%	65 100%

Table 3 shows that the dependency of librarians on regional libraries is to a lesser extent in the range of 25% to 50%. To a moderate extent of 50%, the librarians depend on other library collection especially for technical reports and the proceedings of CSW. Not much of dependency on other libraries can be noticed as far as institution publications and theses volumes are concerned. From this, it can be deduced that a large percentage of librarians depend on regional libraries to the lesser extent of 25% to 50%. The librarians need to be educated to make use of the resources and services of regional libraries too for meeting the needs of the users beyond expectation, and thereby creating the 'delight' among the library users. This has to be treated as the quality library services.

Table 4:User- wise frequency of access and use of GL

Sl. No.	Frequency	Category of Users					
		Faculty guides	**Percentage**	**Research scholars**	**Percentage**	**Total**	**Percentage**
1	Most frequently	20	5.9	67	7.2	87	6.8
2	Frequently	189	55.6	519	55.8	708	55.8
3	Moderately	98	28.8	279	30.0	377	29.7
4	Occasionally	31	9.1	64	6.9	95	7.5
5	Not at all	2	6	1	0.1	3	0.2
	Total	**340**	**100**	**930**	**100**	**1270**	**100**

A large segment of users, 209 faculty guides and 586 research scholars representing 61.5% and 63% respectively, access and use GL frequently or most frequently for academic and research needs. The negligible number of users, 2 faculty guides and 1 researcher have offered negative opinion. From among the entire population of users, it is clearly evident that 62.6% of them access GL quite often. Hence, it is true that the GL collection available in the holdings of the engineering college libraries is of great value for the faculty and research scholars.

Table 5:Response on the method of locating the GL in the libraries

Sl. No.	Means of Locating GL	Faculty Guides		Research scholars		Total	
		No.	%	No	%	No	%
1	Use of catalogues	128	37.6	331	35.6	459	36.1
2	Use of new arrival lists	97	28.5	250	26.9	347	27.3
3	Web notices/alerts	17	5.0	50	5.4	67	5.3
4	Browsing at the shelf	98	28.8	299	32.2	397	31.3
	Total	**340**	**100**	**930**	**100**	**1270**	**100**

It is clear that 459 respondents representing 36.1% use the library catalogs. Further, it is also important to note that 347 respondents comprising 27.3% use new arrivals list compiled by the libraries. Another segment of respondents representing just 5.3% depends upon web alerts, web notices. It is worth observing here that 397 respondents representing 31.3% follow the method of browsing at the shelves. Among the patterns of locating grey literature, use of library catalog and browsing at the shelves are being followed to a greater extent.

It is evident from chart 1 that the large majority of the faculty guides have indicated that the technical reports, proceedings of CSW and dissertations are useful in the higher range of 50% to 75%. However, the doctoral theses, trade literature and institutional publications are useful in the lower range of 25% to 50%. From this it is clear that the entire collection of GL is moderately useful for faculty for teaching purpose.

**Chart 1 :Range of use of GL by majority of faculty for teaching**
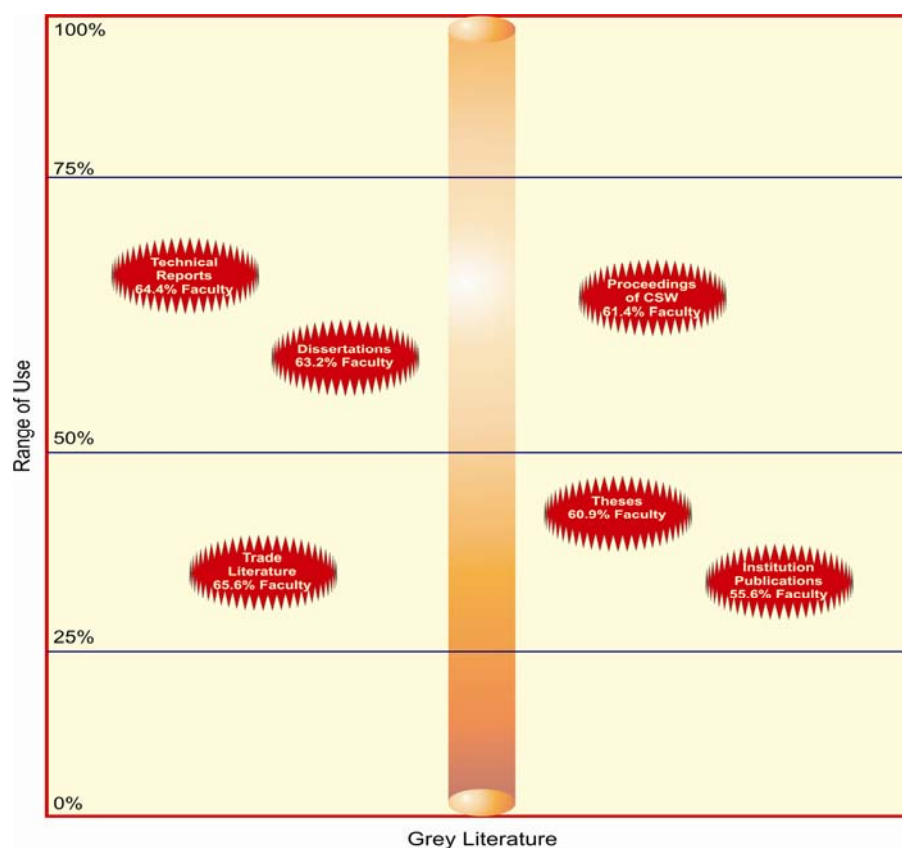
The extent of the use of GL for teaching is low when compared to the use for research purpose. Invariably, scholars need current literature and up-to-date statistics for preparation of research articles for scholarly journals, research papers to be presented in the seminars and conferences, bringing out research monographs, delivering special lectures and keynote addresses, and preparation of project works and research reports/theses. All these constitute the task of research work, for which scholars rely upon library services on modern lines.

Chart 2 depicts that large majority of the faculty members have opined that GL comprising theses, dissertations, technical reports, and the proceedings of the CSW are useful in the highest range of 75% to 100%. However, trade literature and institutional publications are found useful in the higher range of 50% to 75%. From this it is clear that all type of GL collections form vital sources of information for faculty for research
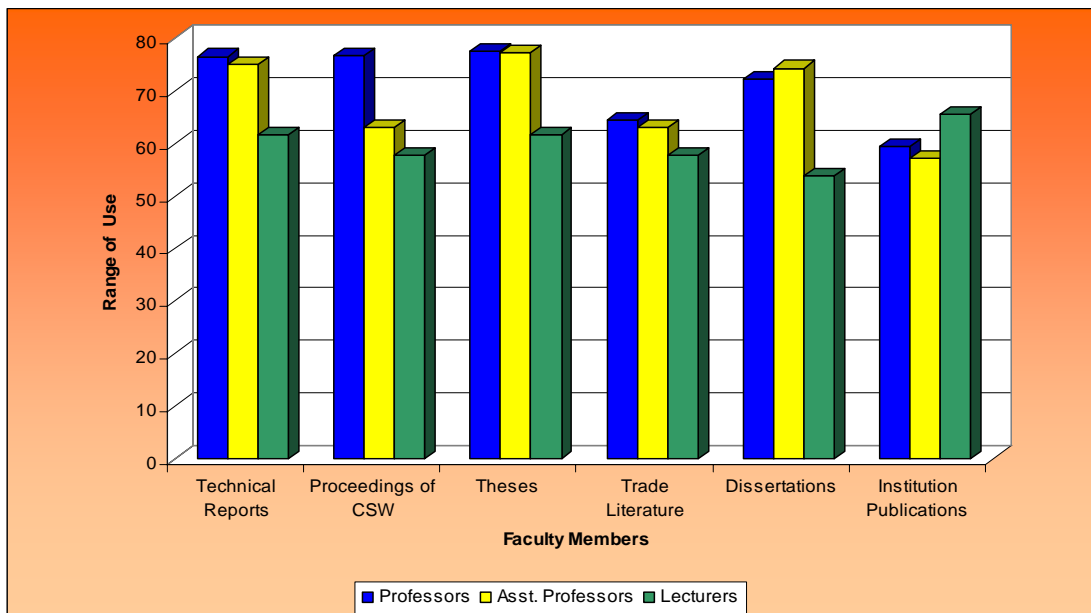
Chart 2:Range of the use of GL by the majority of the faculty for research
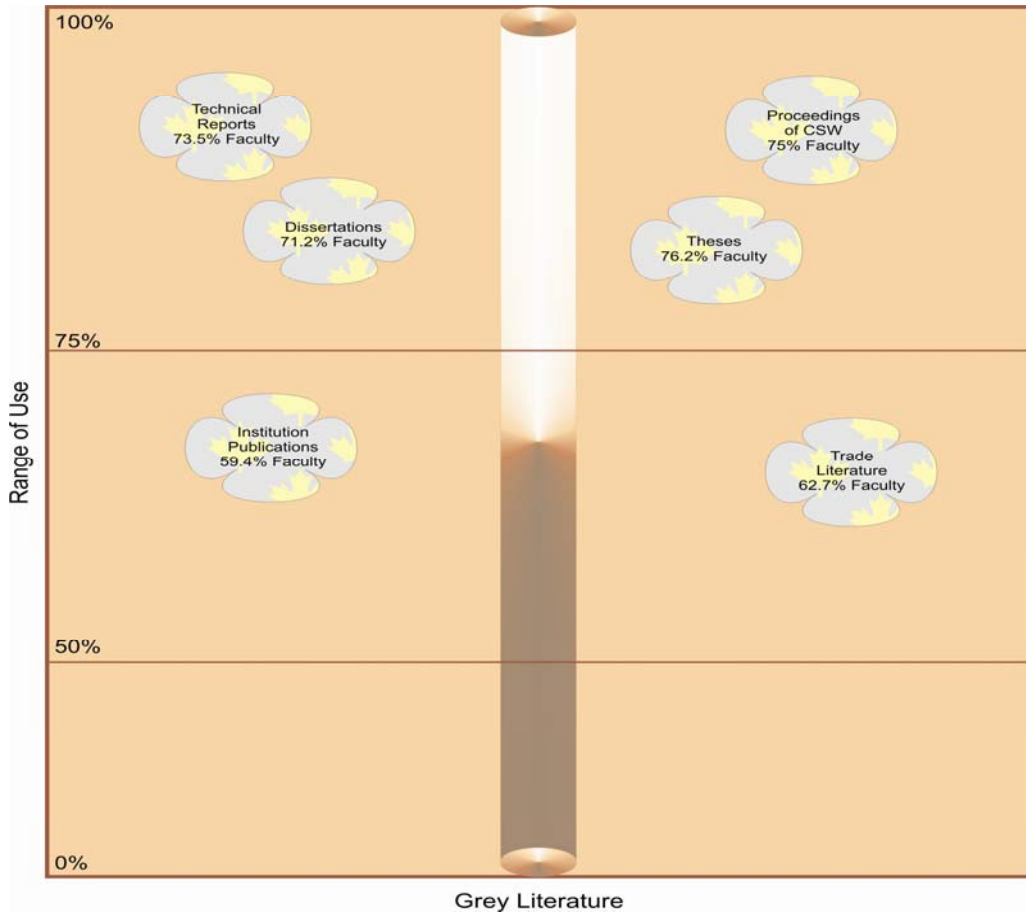

The below bar diagram clearly indicates that a large percentage of professors and associate professors rely upon GL for research. However, comparatively lower percentage (59.6%) of lecturers does depend on GL collections for research tasks. Professors possess long research experience when compared to lecturers.

Chart 3:Faculty-wise frequency of access to GL for research

**Chart 4: Range of the use of GL by the majority of the research scholars**
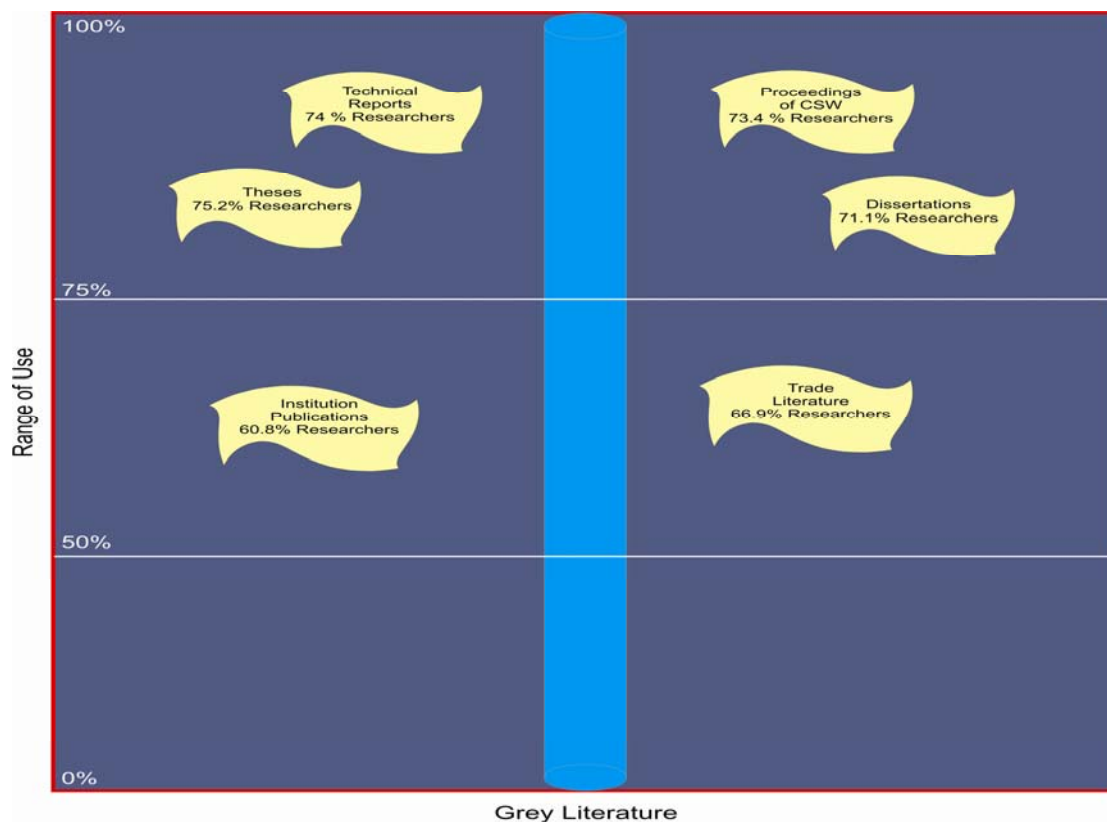
A large majority of the researchers rely upon theses, dissertations, technical reports and proceedings of CSW in the highest range of 75% to 100%. However, the use institutional publications and trade literature is noticed in the range of 50% to 75%. From this it is clear that the research scholars use GL collections of all types to a great extent for research and publications.

Table 6:Use of GL in the highest range for research and publication

S. No.	Category of GL	Use in the highest range of 75% to 100%		
		Faculty Guides	Research scholars	Total
01	Theses	259 76.2%	699 75.2%	958 75.4%
02	Dissertations	242 71.2%	661 71.1%	903 71.1%
03	Institutional publications	159 46.7%	456 49.1%	615 48.4%
04	Trade Literature	147 43.3%	449 48.3%	596 46.9%
05	Technical Reports	250 73.5%	688 74.0%	938 73.8%
06	Procedures of CSW	255 75.0%	683 73.4%	938 73.8%
	Average use in Percentage	64.3%	65.2%	64.9%

Chart 5: Use of GL in the highest range for research
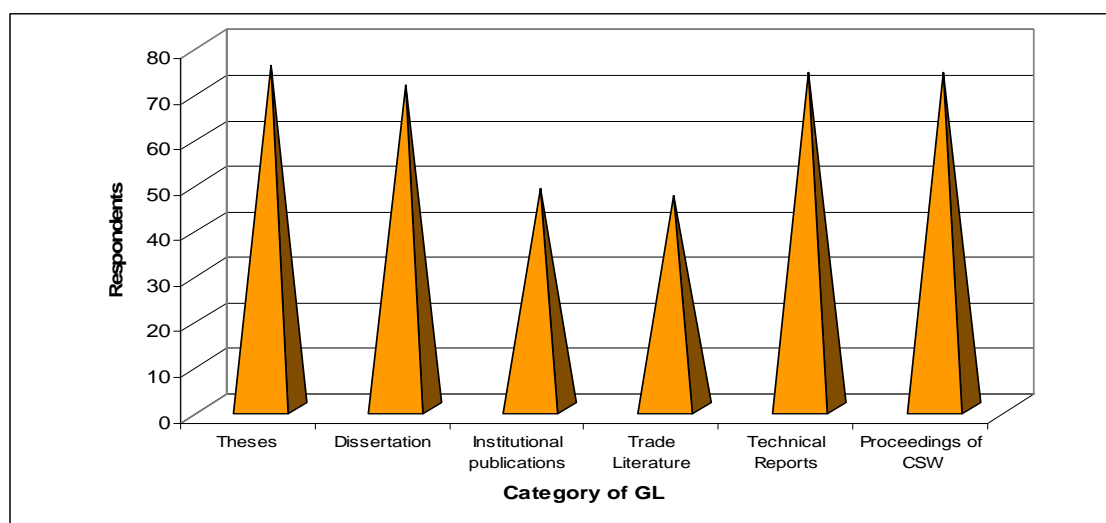
As regards the six types of GL, an overwhelming majority, representing 71% to 75% of the users (faculty and researchers) opine that the theses, dissertations, technical reports and the proceedings of CSW are useful in the highest range for research purposes. On the other hand, slightly less than half of the users, 46% to 48% feel that the institutional publications and trade literature are useful in the highest range. The MAGIC project undertaken by Paul A. Needham and others in the year 2002(p.7), pointed out that the engineers often rely upon, technical reports, for research purposes.

Table 7:Faculty guides on the method of keeping track of recently released GL

Sl. No.	Method of keeping track of GL	Designation wise faculty guides			
		Professors	**Asst/Associate Professors**	**Lecturers**	**Total**
1	Regularly attend CSW	158 64.8%	5 7.1%	19 73.1%	222 65%
2	Browse the web	64 26.2%	45 64.3%	7 26.9%	86 25.3%
3	Visit other/local libraries	16 6.6%	15 21.4%	Nil	21 6.2%
4	Don't keep track of GL	6 2.5%	5 7.1%	Nil	11 3.2%
	Total	**244** **100%**	**70** **100%**	**26** **100%**	**340** **100%**

Here, 64.8% of the professors and 73.1% of the lecturers keep track of the release of the proceedings of the conferences, seminars and workshops as they regularly attend such programmes. 64.3% of the assistant and associate professors browse the web for

information on grey literature. Only a small percentage of faculty guides go to local libraries in search of grey literature acquired recently. 6.6% of professors and 21.4% of assistant professors have the habit of relying upon the local library collections. A large majority of faculty guides to the extent of 65% keep track of recently released conferences, seminars and workshop proceedings by regularly attending the programmes.

Table 8:Response on the weeding-out of outdated GL collection

Sl. No.	Response on weeding out of the old GL	Faculty guides and Research scholars			
		Government colleges	Aided colleges	Private colleges	Total
01	Yes, weed out	12 (41.4%)	105 (28.4%)	302 (34.7%)	419 (33.0%)
02	No, don't weed out	17 (58.6%)	266 (71.6%)	568 (65.3%)	85 (67.%)
	Total	**29 (100%)**	**371 (100%)**	**870 (100%)**	**1270 (100%)**

67% of the respondents opine that the old grey literature should not be weeded out from the libraries. They prefer to see that the old grey literature collection still maintained in the library for easy access and use. In the present study, 33% of the respondents argue in favour of regular weeding out process which facilitates easy access. It is important to note that research centres of engineering colleges need to maintain old collection of GL systematically organised for use.

Now-a-days, library cannot meet the needs of its users from its own collection. To meet various needs of users and inter-disciplinary approaches, libraries need to depend on the information sources of regional libraries in a network environment. The information resource sharing programmes have come up on account of this trend.

Table 9:Gender-wise response on knowledge of GL of regional libraries

Sl. No.	Knowledge of GL available in other libraries	Gender-wise response of users					
		Male Respondents		Female Respondents		Total	
		No.	%	No.	%	No.	%
01	Yes, I have the knowledge	455	47.3	101	32.8	566	43.8
02	No, I have no knowledge	507	52.7	207	67.2	714	56.2
	Total	962	100	308	100	1270	100

It is evident from the above table that 43.8% of the users are familiar with the GL collections of regional libraries. A major segment of respondents express that they have no knowledge of GL collection of regional libraries. This segment of the respondents account for 56.2%.While considering gender-wise familiarity, 67.2% of the ladies who are faculty guides and researchers have no knowledge about the GL collection of regional libraries. Only 32.8% of the ladies are familiar as they make use of regional libraries. However, 46.8% of the male respondents are familiar with the GL collection of regional libraries. From this it can be deducted that a large segment of female respondents have no knowledge of GL collection of regional libraries. They find it difficult to move out of their colleges and travel for long distance to locate and refer GL of regional libraries. Therefore, there is need to compile the union list of important GL available in local libraries, as well as, engineering college libraries. Further, the bibliographic details of GL available in these local and engineering college libraries may be made accessible on-line.

6. Training Needs Projected by the Users and Librarians.

Table 10:Orientation / Training needs projected by the users

Sl. No.	Category of Response	Faculty Guides		Research Scholars		Total	
		No.	%	No.	%	No.	%
01	Strongly agree	159	46.8	345	37.1	504	42.0
02	Agree	158	46.5	499	53.7	657	50.1
03	Agree to a little extent	18	5.2	79	8.5	97	6.8
04	Disagree	5	1.5	7	0.8	12	1.1
1+2	Agree & strongly agree	317	93.2	844	90.7	1161	91.4

Training has become essential for academic growth. The necessity of training is noticed for updating professional skills. This is especially more so in case of the staff working in the field of Engineering Sciences sand Technology. Laloo (2002, pp. 140-148) describes in his work on "Information needs, information seeking behaviour and users" various methods of user education, especially the teacher users. The methods and steps explained here are useful. Considering the responses of both the categories of users, an overwhelming majority of the respondents representing 91.4% argue in favour of conducting orientation/training programmes for better access and use of GL collection. However, only 12 respondents representing just 1.1% hold negative view; such a kind of orientation or training is not necessary for them.

Table 11: **Training requirement projected by the librarians**

S. No.	Response on Training Requirement	Government Colleges	Aided Colleges	Private Colleges	Total
01	Positive response	5 8.33%	9 100%	43 89.2%	57 87.7%
02	Negative response	1 16.7%	Nil	7 10.8%	8 12.3%
	Total	**6** **100%**	**9** **100%**	**50** **100%**	**65** **100%**

The highlighting fact is that 57 librarians representing 87.7% express positive response stating that they need to attend training / orientation programmes in order to up-date themselves with latest trends and developments.   The study conducted by Paul A.S. Needham, et.al.(2002, pp113-116), in the MAGiC Project Report submitted in the year 2002, furnishes conduct of seminar for working librarians. Such a seminar was organized at the British Library, London for the participants on managing effective access to GL collection (technical reports) available in the regional libraries.

Table 12:Extent of training needed by the librarians

S. No.	Extent of training requirement	Government Colleges	Aided Colleges	Private Colleges	Total
01	Higher extent	4 80.0%	7 77.8%	30 69.8%	41 71.9%
02	Moderate extent	1 20.0%	2 22.2%	11 25.6%	14 24.6%
03	Slight extent	Nil	Nil	2 4.6%	2 3.5%
	Total	**5** **100%**	**9** **100%**	**43** **100%**	**57** **100%**

Large segment of library staff representing 71.9% feels like undergoing intensive training in order to develop and handle GL collection on modern lines. Here, it is recommended to organize orientation programme or workshop by the Professional Associations for 3 to 4 days covering the themes of;

- Organization and building of GL collection
- Rendering information services using GL collection.
- Resource sharing in the network environment
- Creation of digital repositories

The workshop may also cover extension programmes such as display of important and current GL in engineering sciences, and invited talks by the resource persons.

7. CONCLUSIONS

The faculty and researchers who are actively engaged in research have felt the importance of GL. Having noticed the value of GL mainly for research, a large majority of them is found accessing and using GL collections existing in the holdings of the engineering college libraries in the higher range of 50% to 75%. The working librarians in the recognised research centres have been experiencing increased demand for GL

The holdings of GL lack up-to-date collection in 43.7% of the libraries. However, it is encouraging noting that the majority of the libraries have systematically organised their GL collections with classification and cataloguing schemes. On account of this, the collections in most of the libraries are easy to access and use. The institutional publications and trade literature are hereby recommended to maintain in coloured box files and arranged in the chronological order so that, identification and access becomes easy for the users on account of the uniformity and consistency in colour coding.

The librarians, faculty members and the library committee have to come together for developing strong need based GL collection in every library. Irrespective of the cadre, every faculty and researcher has to be encouraged to recommend GL for procurement which they consider as vital for research. In this way, the collection can be strengthened in every engineer discipline. Educate the faculty and researches through orientation so as to identify, recommend and uninterruptedly access GL collections. Secondly, orientation is expected to develop knowledge and skills among working librarians for tracking, procuring, organising and facilitating better access to GL collections in the networked environment.

What is most important is augmenting the programme of sharing the resource of GL in the networked environment. The GL holdings of engineering college libraries and the technical libraries of the region have to be freely accessed and shared for mutual and reciprocal benefits. For the purpose of bringing the collection of GL together, there is need for developing the database of the holdings and facilitating on-line access. This venture in fact has to be encouraged and supported by all the concerned as this programme has to be developed and nurtured on co-operative basis, settling the issue of copyright.

While considering the GL by the category, VTU must insist research scholars to submit their doctoral theses and dissertations in soft copy so that, full-text of the digital

version can be made accessible on LAN / web site. The Vidyanidhi Project of Digital Theses which has already digitized a part of the theses available in the holdings of university libraries in India may also consider taking up the theses available at VTU. Further, the proceedings of the conferences and seminars form valuable sources, projecting vast amount of data, including the trends in the field, useful for scholars. Creation of an open repository by the VTU will be of immense help as the large segment of researchers has inclination to refer to these proceedings, time and again. The materials for digitization may be decided upon considering the below indicated alternatives as well as, on the feed-back of the user community.

- Digitise the entire collection of the proceedings.
- Digitise only the recent ones of 3 to 5 years
- Dgitise only the active collection/those that are in demand.
- Digitise, considering the emerging new disciplines/thrust areas of research

The faculty and researchers to a considerable extent are found relying upon the local libraries, where the GL collections are comprehensive and up-to-date. However, it is highlighting that a large segment of female users though they have felt-need for grey literature, are ignorant of the collection of regional libraries on one hand, and face practical difficulties to freely move out of their colleges and travel a long distance and get into the environment of other libraries. Hence, there is need for creating on-line database in order to show the availability of various GL collections of engineering college libraries. Further, the libraries have to take initiative for getting the required GL on inter-library co-operation. It is also a good practice if individual libraries host new additions of GL on the web sites/blogs. Of late, open digital repositories facilitating on-line access is desired. The VTU has to venture in this direction to augment quality research and output of publications.

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