"It is the good reader that make the good Book"

- R.W. EMERSON

CHAPTER SIX

SURVEY AND ANALYSIS.

GENERAL ASPECTS.
INFORMATION SEEKING BEHAVIOUR.
STARTING.
CHAINING.
BROWSING.
DIFFERENTIATING.
MONITORING.
EXTRACTING.
SUMMARY.
CHAPTER SIX

SURVEY AND ANALYSIS

All the teachers selected as samples are working in 17 Regional Engineering colleges in India and are involved in teaching and research activity. Among the total of 800 samples, 126 are covered under interview method and their teaching and research interest topic list is enclosed in Appendix 1. The other 574 teachers have responded to the questionnaire method.

(A) GENERAL ASPECTS:

Certain personal data such as nature of work, specialisation, experience, details concerned to professional characteristics are collected from the survey to correlate and facilitate the analysis of information seeking behaviour and communication pattern. The main intention is to look at the influence of the environmental systems on information communication information seeking behaviour among the faculty in Regional Engineering College Systems. The survey analysis is advancing logically from individual characteristics to information seeking behaviour and finally to communication pattern. The professional designation and the samples surveyed are as follows:

1. Professors --- --- --- --- 174 members 24.86%
2. Assistant Professors (Readers) -- 223 " 31.86%
3. Lecturers --- --- ----- -- 303 " 43.28%
4. Male Teaching Faculty--- --- --- 674 " 93.00%
5. Female Teaching Faculty--- --- --- 26 " 7.00%
The Figure 8 indicates that the samples representation of each category which is according to their strength in the Regional Engineering Colleges faculty members in different categories.

It is observed that the population of lecturers (43.28%) is more than the Assistant Professors (Readers) (31.86%) and of Professors (24.86%) in these colleges.

With reference to the gender 93% (674 samples) are male and only 7% (26 samples) are female. The number of women in faculty positions in Indian Regional Engineering Colleges is low. This is a fairly representative of the entire population.

Classification of the respondents based on their experience (service) is shown in the following table.

**TABLE - 6.1**

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Numbers of Faculty and %</th>
<th>Professor</th>
<th>Asst. Professor</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nos. %</td>
<td>Nos. %</td>
<td>Ncs. %</td>
</tr>
<tr>
<td>1-10</td>
<td>280 (40%)</td>
<td>5 1.79</td>
<td>24 8.57</td>
<td>251 36.64</td>
</tr>
<tr>
<td>11-20</td>
<td>302 (43.15%)</td>
<td>71 23.50</td>
<td>181 60.00</td>
<td>50 16.50</td>
</tr>
<tr>
<td>21-30</td>
<td>94 (13.45%)</td>
<td>78 83.00</td>
<td>14 15.00</td>
<td>2 2.00</td>
</tr>
<tr>
<td>31 and above</td>
<td>24 (3.4%)</td>
<td>20 83.40</td>
<td>4 16.60</td>
<td>- -</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>700</strong></td>
<td><strong>174</strong></td>
<td><strong>223</strong></td>
<td><strong>303</strong></td>
</tr>
</tbody>
</table>

As for as experience of the respondents is concerned out of 700 members, 280 (40%) are in the group of 1 to 10 years.
SAMPLE POPULATION SURVEYED

- Professors: 25%
- Lecturers: 43%
- Asst. Prof.: 32%

FIG. 8
89.6% of lecturers have 1 to 10 years experience. 8.57% of Assistant Professors and 1.79% Professors are in this range. It is indicated that most of the lecturers are having less experience when compared to assistant professors and professors. 302 (43.15%) respondents indicated between 11-20 years of experience and among them 60% are Assistant Professors and 16.5% are Lecturers and 23.5% are professors. And 94 (13.43%) of them have indicated that they had experience which ranged from 21-30 years. Among the 24 (3.4%) members, 83.4% are having more than 30 years of experience of which all are senior Professors and deans of faculty. And there are about 4 (16.6%) members who are Asst. Professors.

Table 6.2 indicates the Age wise distribution of the teaching faculty of Regional Engineering Colleges in India.

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>% of total respondent (700)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>250</td>
<td>35.71</td>
</tr>
<tr>
<td>31-40</td>
<td>186</td>
<td>26.58</td>
</tr>
<tr>
<td>41-50</td>
<td>154</td>
<td>22.00</td>
</tr>
<tr>
<td>51-60</td>
<td>110</td>
<td>15.71</td>
</tr>
</tbody>
</table>

It is observed from the above table that 35.7% of teaching faculty are between the age group of 21 to 30 years. Almost all young and energetic lecturers are coming in this category. The other groups are 26.58% of which most of them are
Assistant Professors, fall in the range of 31 to 40 years. 22% of the respondents are belonging to the age group 41 to 50 and this group consists of the categories of Asst. Professors and Professors. 15% of respondents who are above the 51 years, and most of them are senior professors.

Educational background is an important factor for academicians while studying the information seeking behaviour. The research review studied in the chapter two revealed that the faculty members with engineering education give importance to personal competitiveness for improving their qualification. This in turn leads them to research activities for procuring the higher educational qualifications.

**TABLE - 6.3**

EDUCATIONAL QUALIFICATION OF TEACHING FACULTY

<table>
<thead>
<tr>
<th>Degree</th>
<th>Numbers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors Degree (B.E.)</td>
<td>82</td>
<td>11.72</td>
</tr>
<tr>
<td>Masters Degree (P.G.)</td>
<td>242</td>
<td>34.57</td>
</tr>
<tr>
<td>Doctorate Degree (Ph.D.)</td>
<td>376</td>
<td>53.71</td>
</tr>
</tbody>
</table>

Academic qualification gaining is the important aspect to the teaching faculty as they have to be well qualified according to the recruitment rules of the respective colleges. Table 6.3 presents the educational qualifications of teaching faculty of...
R.E.C's in three types. It is observed that 11.72% of the teaching faculty are merely graduates. They are all new entrants to the colleges as assistant lecturers and demonstrators and assist in teaching the practicals in the laboratory. 34.57% of the respondents are having post graduate (M.E/M.Tech) degrees.

The study reveals that 53.71% of the faculty have completed the research degrees (Ph.D.). This shows that majority of them are experienced research workers qualified for the teaching posts and capable of carrying research work in their respective fields. The provision of Quality Improvement Programme (QIP) of Government of India has helped the faculty to do Ph.D. in all R.E.Cs.

All 15 R.E.C.s are having research programme leading to Ph.D. and other 2 R.E.C.s recently started have only undergraduate courses. In the beginning all these colleges were designed to have undergraduate courses only. The change in introducing Postgraduate courses, motivated, REC's to start research activities. 8 colleges have been given the "Deemed University" status with administrative autonomy and academic autonomy. These institution are in a position to look after Research activities of Basic Research, Applied Research, Other Research and Developmental activities with the emphasis on research problems. However there are some colleges where the Research Projects and Programmes are of National and International Order. Table 6.4 is presenting the Faculty involvement in Research Activities.
### Table 6.4
**Research Activities**

<table>
<thead>
<tr>
<th>Activities</th>
<th>No. of faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty Engaged in Research</td>
<td>616</td>
</tr>
<tr>
<td>Doctorate Degree awarded from R.E.C</td>
<td>176</td>
</tr>
<tr>
<td>No. of persons Register for Ph.D.</td>
<td>340</td>
</tr>
<tr>
<td>No. of P.G. Dissertation guided per year</td>
<td>1200</td>
</tr>
<tr>
<td>No. of Research projects Underway in R.E.C</td>
<td>802</td>
</tr>
</tbody>
</table>

Study reveals that 88% of the teaching faculty are engaged in research. Lecturers who have only graduation to their credit are not taking part in the research activities. Research Experience ranges from 5 to 30 years. Already 176 Ph.D’s are awarded under the guidance of engineering faculty of R.E.C.’s and 60% are guiding for Ph.Ds. In an Academic year, on an average about 82 Ph.D students are registered all over the country in R.E.Cs. In addition to this 8 to 18 research projects are undertaken in each R.E.C. Colleges every year.

These projects are National and International levels. The following countries are sponsoring the projects in R.E.C’s in all over India.

1. British (ODA) Projects on
   1. Informatics Theme.
   2. Design Theme.
   3. Energy Theme.
2. Canada Projects on
   1. Water Resources.
   2. Corrosion.

3. Danish International Development on
   1. Environmental Engineering.

4. Australian Projects on
   1. Water Resources.

5. World Bank Assistance for
   1. Electronics & Communication.
   2. Computer Engineering.

These projects aim to strengthen technical education in India through different sources. These aids are focusing on theme projects and on development of R.E.C. system through upgraded institutional management, strengthened links with industries, improved pedagogic skills including curriculum development, enhanced income generation capacity, entreprenuership and Information support in these R.E.C.'s.

**TABLE - 6.5**

<table>
<thead>
<tr>
<th>Position</th>
<th>Reading Hrs.</th>
<th>Teaching Hrs.</th>
<th>Experiment Hrs.</th>
<th>Consultation Hrs.</th>
<th>Administration Hrs.</th>
<th>Research Hrs.</th>
<th>Total Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>2.45</td>
<td>2.30</td>
<td>1.00</td>
<td>0.45</td>
<td>1.30</td>
<td>1.15</td>
<td>8.65</td>
</tr>
<tr>
<td>Asst. Prof.</td>
<td>2.20</td>
<td>3.20</td>
<td>0.45</td>
<td>0.30</td>
<td>0.30</td>
<td>0.50</td>
<td>6.95</td>
</tr>
<tr>
<td>Lecturer</td>
<td>2.1</td>
<td>4.00</td>
<td>1.15</td>
<td>0.20</td>
<td>0.10</td>
<td>0.35</td>
<td>7.95</td>
</tr>
</tbody>
</table>

As shown in table 6.5 Professors are engaged more in research activities and they are reading more hours as compared to other two categories, they are also involved in administration
and consultation work more than the Asst. Professors and Lecturers. Asst. Professors are involved more in teaching and experimental work rather than professors and lecturers. Lecturers are involved in teaching and laboratory experiment work. They are less involved in administration and consultation work. Their reading habit is equally good compared to the professors and Asst. professors hence they are involved more in teaching.

It has been hypothesized that engineering faculty use more time for reading owing to teaching and research activities. It is observed that the higher the rank, the more time used for reading. This difference is clear between Professors and lecturers. This might be explained by the fact that the active researchers will read much and they are involved in many tasks like consultations, administrations and actively publishing the findings as reports and papers. Figure 9 depicts the different activities and Time spent by engineering faculty members.

(B) INFORMATION SEEKING BEHAVIOUR:

The interviews and questionnaires clearly depicted a range of useful concepts divided into two separate areas. They are information seeking and information communication. From the first concept six core categories are identified to explain the information seeking behaviour activities of the respondents. These core categories as developed by Ellis, (1989)¹ are Starting, Chaining, Browsing, Differentiating, Monitoring, and Extracting. Further there are sub-categories for each core category the details of which will be mentioned in the analysis. Ellis describes these Core Categories as follows;
TIME SPENT ON VARIOUS ACTIVITIES EVERYDAY BY THE FACULTY (IN HOURS)

FIG. 9
Starting: "activities, characteristic of the initial search for information i.e. Analysing."

Chaining: "following chains of citations or other forms of referential connection between materials i.e. synthesizing."

Browsing: "semi-directed searching in an area of potential interest i.e. arranging."

Differentiating: "using differences between sources as filters on the nature and quality of the material examined i.e. Filtering."

Monitoring: "Maintaining awareness of developments in a field through the monitoring of particular sources i.e. up-dating."

Extracting: "Systematically working through a particular source to locate material of interest i.e. Focussing" to pinpointedness.

These six core categories are considered appropriate to cover the main areas of activity engaged for information seeking by the engineering faculty. As in Ellis's model (1989) these core categories can be used to describe any individual patterns of information seeking behaviour. However, the model does not attempt to define the interactions and interrelationship between the categories, or the order in which they are carried out. The exact relationship of the features of the model depends upon the circumstances associated with the information seeking behaviour of a particular individual at a particular time. Thus the model is flexible and able to accommodate factors affecting information seeking behaviour such as environment, personnel factors, the stage of scientific work and the nature of the information need. The six core categories of information seeking behaviour with reference to Engineering Faculty are described in detail.
6.1 STARTING:

Ellis (1989), defines starting as those activities used to initiate a search for information. Starting may occur when a researcher commences the work on a project. This refers to initial familiarisation of information needs during life time of an existing project, e.g. in response to unexpected results or a new direction in the project, initial familiarisation is an easily identifiable stage in any investigation of information seeking activity.

This category of analysing identifies the activities which are undertaken in the earliest stages of the information seeking process. Key starting points were identified in relation to a new project or area of research being undertaken by the respondents.

Starting refers to the initial points adopted by the respondents when they embark on the process or pattern of information seeking activity. It is the first stage of the process and is clearly undertaken by all the respondents.

In order to try and develop a substantial theory from the discovery of this core category it was important to examine the responses of all the 700 respondents. The responses investigated initial starting process in depth and as a result each respondent provided a full explanation of their starting strategy in a variety of contexts relating to the extent of familiarity with the topic.
6.1.1 PERSONAL CONTACT:

Analysis of the responses revealed that Engineering Faculty have employed a form of personal contact as starting point. Closer analysis of the data indicated that personal contact was used by the respondents to start searching for a variety of information, such as research papers, references, books, reviews, journals, general reading and searching for the work of specific authors.

Following are some of the statements made by the respondents in this context which are self explanatory;

"Contacted some expert from Indian Institute of Technology and brought them to teach initially, by their help in getting required information & started work on systems analysis and design." (R2)

"Initially contacted colleagues, staff and attended research meetings then, I started to search information on my research." (R16)

"When I started my teaching profession first I discussed with some senior expert colleagues, superiors in this field. I had long time contact and working experience as student with them in this field of semiconductor then I went for published literature. Then I started independent research on semiconductor and teaching the subject." (R21)

Above responses establish quite clearly the personal contact and personal recommendation and its important role in the starting process.

The personal contact and personal discussion with other colleagues has been depicted in Table 6.6
The respondents handle positive attitude towards personal contacts and sharing the information while starting the research or teaching profession. The personal contact is then from superiors to the students level and with others who are even non professionals. During information seeking activity inter personal communication, Informal discussion and information sharing are found to be basic activity in engineering faculty.

Among all the 700 respondents, Professors are having personal contact with peers and colleagues which is 20.57% compared to subordinates and Juniors which is about 18.86%, with Research scholars 17.86% and with P.G. and undergraduate 19.43%, and with superiors is only 12.43% and finally with others is 2.71%. This shows that professors are having informal information sharing more with peers, colleagues and students.

Asst. Professors are also sharing the information needs with superiors 26.43%, peers and colleagues 30.71%, subordinates 30.29%, Research scholars 20.57%, Students 29.71% and with others 1.71%. They are having more close contact with superiors and subordinates.
Lecturers are sharing information with superiors 30.29%, peers and colleagues 39.57%, subordinates 37.86%, Research scholars 23.86%, students 37.29% and with others only 2.86%. This shows that lecturers have close contacts with superiors, peers and colleagues as well as students. All teaching faculty are having idea of "Let noble thoughts come from all sides of the world". Among the six categories mentioned in the group, the personal contact is more with peers and colleagues. That means the teaching faculty will share the information more closely with friends, peers and colleagues. This has been depicted in Fig.10. All the respondents are able to illustrate a point in the time when they began research project or moved into a new area of teaching work, they had personal contact or informal way of seeking information at the starting point. 84% of the respondents began their research and teaching simultaneously which could clearly identify their initial starting point and the strategy used in the process of familiarisation. It was considered interesting as it promoted information search.

The use of personal contact as an information seeking activity for the purposes of starting led to the recommendation of a variety of information types and sources. This variety of sources were arranged in a hierarchy to display frequency of occurrence amongst responses. This indicated that personal contact as a starting point for information seeking activity led mainly to key papers, references, textbooks and journal articles etc.
This form of personal contact employed was in either a formal or an informal capacity, as occurrences of both were frequently mentioned in responses. Formal contact is defined as talking to colleagues and friends and written contact with experts in the field. Occurrences of formal contact were specifically, mentioned by respondents in the context of beginning their existing topic of research.

"As a teacher I initially correspond with experts in the field then I go to traditional media such as Journals, books and conference proceedings, etc." (R10)

"While teaching I need subject Information more often available in text books, and for consultation, works cites and research oriented works discussions with colleagues on specific matters attending conference makes me to search for new information. (R13)

"Teaching keeps in touch with people working in the field, approach them and talk to them personally when the information is needed for starting the work on a new project." (R19)

Informal contact played a larger role than formal contact and involved a variety of the respondents in a variety of ways. The process of initial starting although emphasizing a key activity, that is personal contact, must also be understood as an integrated strategy. 92% of the respondents, employed a variety of means to discover their information behaviour to one starting point. In reality 78% of the respondents used a combination of methods to search new material. At the time when personal recommendation was used in conjunction with another source as starting point for the searching of information, the sources employed included Abstracting journals, Engineering Index and Science Citation Index as the basis for a literature search.
Other types of sources included Journals, textbooks, conference proceedings and the respondents own collection of references. Several respondents employed the strategy of a literature search to complement the activity of personal consultation.

6.1.2 INDUSTRY-INSTITUTE INTERACTION:

Analysis of the responses revealed that 56% of the respondents have connection with industries and they spare their time for consultancy service needed to industries. 42% of faculty have taken part in industry connection as Industry Institute interaction activities. Table 6.7 presents the time spent on these activities by engineering faculty. It is also presented in Fig. 11.

**TABLE - 6.7**

<table>
<thead>
<tr>
<th>Position</th>
<th>Consultation Hrs.</th>
<th>Industrial needs service Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Professors</td>
<td>5.83</td>
<td>1.7</td>
</tr>
<tr>
<td>2. Asst. Professors</td>
<td>4.69</td>
<td>1.48</td>
</tr>
<tr>
<td>3. Lecturers</td>
<td>3.06</td>
<td>1.38</td>
</tr>
</tbody>
</table>

Several problems are faced by Industries in their day today activities. For solving these problems, engineering faculty are being approached for providing expertise and consultation. Teaching faculty inturn have the task of sorting out these problems. These tasks initiated to go for the information seeking for finding the solutions. Thus the need for information on the
TIME SPENT ON INDUSTRY-INSTITUTE INTERACTION ACTIVITY

- IND. NEED SERVICEE
- CONSULTATION

FIG. 11

PROFESSORS
ASST. PROF.
LECTURERS

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problems led them to the practical research and search for the information as a starting point. Table 6.7 shows that 42% of the teaching faculty will spend more than 15 hours for the purpose of industry institute interaction activities per week and the professors are spending 5.83 hours per week for consultation work and about 2 hours for solving the industrial problems and services to industries. So also with Asst. Professors and lecturers, as they are also involved in these activities. Following are some of the statements made by the respondents in this context.

"My research on brick structure started as a result of problem faced by the architect and members of the construction company I worked. There I was forced to start searching information on bricks and ceramic structures." (R5)

"I served before I came here as a professor, at the Central Machine Tools Institute on the lubrication of engines this enabled me to start the research work on lubrication." (R7)

"After my Ph.D. I was introduced to One Industrial research laboratory as R & D Scientist. I started work on solidification. Which was useful to that industry and I needed much more information on that topic then I started searching of information." (R62)

The above interview responses indicate clearly that starting of research topic and information seeking will be initiated from the day-to-day problems of field work.

6.1.3 ALTERNATIVE KEY STARTING POINTS:

In a minority of cases of about 26% of respondents have alternative key starting points to personal contact were
Amongst this gaining process of starting information searching sources are through personal collection, from departmental library source and Institutes library. The use of a computer based literature search was also mentioned. The faculty members are involved in many research activities in the college as well as in several different places of industrial research and other institutes as experts. 154 Members (22%) of faculty are involved in bibliographical search service of databases done by libraries through ON-LINE, E-Mail and CD-ROM database searches.

This indicates that they have wider experience of moving on to the new topics or areas of work consequently they had, become more aware of the variety of tools available to assist them in the information seeking process.

"The alternative sources of information to my work are bibliographical information provided by our own library and the Science and Technology information database services provided by the National Science Information Centre, Indian Institute of Science, Bangalore. I am the registered member for that. They will provide me the latest information on my field through the E-Mail." (R59)

"The Engineering Index (COMPENDEX) CD-ROM which is available in our library, will provide the information for my new research field." (R76)

"Even though I have not got information directly through databases, my research students provide me all information I needed through on-line services provided elsewhere." (R88)

"Our library is having all computerised information services. I search information on new subject as well as on my research topic. I get information by key word indexing system." (R52)

"This new information technology like CD-ROM, Online and E-Mail facilities made our literature search job easy. I am not worried about any new topic of subject in my field. I always keep in touch with library information services. I start immediately when I need some information." (R96)
Even though 60% of the respondents are unaware of this modern information sources, 40% of approaches such as these on latest systems of computer based information services are becoming very common for information search for a strong probability of using information technology for research purposes. Use of Electronic Mail (E-Mail) as an information Communication channel is the key factor for starting.

6.1.4 STARTING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

The data analysed on starting category of information seeking behaviour of engineering faculty had clearly suggests the computer based searches to undertake this type of searches. These were often undertaken at the start of a research project, and with the intention of providing some references from which the individual could proceed to other information seeking activities, particularly chaining. Often engineering faculty starting out a new topic is looking for something which can serve as the basis for chaining and starting. It can change almost immediately to chaining as the individual moves out from the original key references to material cited in that article.

Above point is significant particularly for those concerned with information retrieval system design as searchers may come to a retrieval system with a collection of such references in which case they might proceed directly to chaining, or they may hope that the system will provide them with same starter references which can serve as the basis for chaining. In the former case it is probably desirable that the system be set up to
'prompt' the searcher for starter references. The data base could then be searched to ascertain whether any of these are present or have been cited in other material on the data base.

If the Engineering faculty has no such references, or wishes to identify more, the first step, obviously, would be to try to identify material which seems to match the terms of the subject description supplied by the searcher. If the searcher finds it difficult to disseminate between references obtained from a preliminary subject search then the system may be able to help the searcher to select those which seems most likely to be useful in the two roles previously mentioned, i.e. to alert the individual to principal ideas or key studies and to provide overviews of an area and serve as the basis for chaining. In the first category the searcher may be interested in seeking material which has been highly cited, either by the set of reference obtained, or from that set. The fact that the material is highly cited does not entail that it will definitely be of interest, but the searcher may wish to know whether any material is heavily cited in the area, if only to be aware of its existence.

Following above first category and in the second category, any material which itself has a large number of a references is likely to be worth noting as a potentially rich for chaining. Reviews, review papers, and synoptic articles can be particularly valuable in this role, as the searcher may hope to identify the more important theoretical developments and empirical studies from seeing them cited in reviews, and then following up citations to the individual papers. A facility to identify
review type material or material which made large numbers of references could aid the searcher to select reference which were most likely to provide an overview of an area and be useful as sources of references.

Engineering faculty entering a new area may also find it useful to have some indicative of the sources that publish material of interest. These could be identified either from the sources in which interesting items themselves appeared, perhaps arranged in order of the frequency in which interesting material appeared, or from sources which were cited in material of interest, again possibly ordered in terms of the frequency with which they were cited. The identification of potentially useful sources in this way could also provide the basis for browsing, differentiating, monitoring or extracting. This starting category of information seeking behaviour and Computerised Information Retrieval System is the base for the design of user friendly expert system of information retrieval.

6.1.5 SUMMARY OF STARTING:

'Starting' means analysing the information. The major strategies emerged in the described activity of the engineering faculty with regard to the starting process involve primarily industrial application problems, and people contacting for the provision of starting references.

An alternative approach of seeking information for starting, excluding personal consultation, involves carrying out a literature search. This is achieved by use of computer databases and abstracting and indexing services. The aim of the
literature search is to obtain abstracts of papers to browse these abstracts and retrieve papers of relevance.

The utilization of personal contact as a starting point as an approach to a new topic is a common finding in the literature detailing investigations of information seeking behaviour. Krikelas (1983) in his model on information seeking behaviour stresses that the use of interpersonal communication is a preferred source as a starting point for a pattern of external source consultation. According to user studies when an individual turn to external contact they strongly prefer human (face to face) contact. Krikelas establishes a pattern of information seeking behaviour in respect of external source consultation which involves consulting firstly someone known to the individuals then some one not known to the individuals and thirdly the literature. This pattern was also evident among the engineering faculty members studied.

The importance of the interpersonal, information channel of seeking information and communication has already been documented among scientists and engineers and social scientists. Similar results has been shown here with engineering faculty also.

The reliance on personal contact as a starting point for approaching new topic is according to Krikelas strategy. "Twenty five years later, one might be surprised whenever interpersonal communication does not appear in first place on a list of source preference when individual turn to external sources, they strongly prefer human (face-to-face) contact", Krikelas (1983). It is apparent from this study of analysis that
the most preferred method of retrieving suitable information for initial starting by the engineering faculty responded, involved some form of personal contact.

6.2 CHAINING:

This category seeks to identify the activities engaged in follow up of the references cited in materials, consulted or seeing citation to know and links between materials. Chaining involves following up citations from one source to another. It is synthesizing the information sources. There are two forms of chaining:

Backward Chaining: Following up the references from the material consulted.

Forward Chaining: Finding citations to know relevant work.

Making citations involves a degree of subjectivity. Relevance is the overriding criterion expressed by the respondents for following up references to materials. Several reasons were given by the engineering faculty for making citations. Citations, usually of reviews or seminar papers, were made to provide background information. Other reason for citations included, when using details from previous work, e.g. methodology or conclusions; placing the work in the context of previous work. The focus of interest here is not with citations practices, as such, but with characteristics of pattern of searching for information which involves following citation's between material.
The faculty of engineering, therefore, use their existing body of knowledge to determine whether a citation may lead to something of use to either own work or some one else in the group. 51.85% of them indicated that they would try to cite reviews. This not only points the Engineering Faculty to an overview of the areas which can serve as a starting references but also allows the Faculty to economise the references. It is evident from the following table.

<table>
<thead>
<tr>
<th>INFORMATION RESOURCES</th>
<th>NO. OF RESPONDENTS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information about previous work done in their own field</td>
<td>609</td>
<td>87.00%</td>
</tr>
<tr>
<td>Information about current developments in their field</td>
<td>673</td>
<td>96.14%</td>
</tr>
<tr>
<td>Information about work done in other relevant fields</td>
<td>450</td>
<td>64.28%</td>
</tr>
<tr>
<td>Information on patents, standards and trademarks</td>
<td>197</td>
<td>28.14%</td>
</tr>
<tr>
<td>Technical or scientific data</td>
<td>348</td>
<td>49.71%</td>
</tr>
<tr>
<td>(e.g numeric or structural data)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information about laboratory procedures</td>
<td>348</td>
<td>49.71%</td>
</tr>
<tr>
<td>Health and safety information</td>
<td>189</td>
<td>27.00%</td>
</tr>
<tr>
<td>Information about Govt. Decisions on Science &amp; Technology Policy or funding.</td>
<td>439</td>
<td>62.71%</td>
</tr>
<tr>
<td>Management information</td>
<td>291</td>
<td>41.57%</td>
</tr>
<tr>
<td>Other</td>
<td>42</td>
<td>6.00%</td>
</tr>
</tbody>
</table>

Fig.12 clearly depicts the various Resource fields of information and the references made by Engineering faculty.

For the purpose of chaining of information seeking and choosing references the 96.14% of engineering faculty follow up
FIG. 12
the relevant references about current developments in their field. About 87% of them also follow up previous work done on their own fields. 64.28% of them will also follow up other relevant fields to keep up to date and to help other colleagues in that field of technology. The other field of attraction for following up information to the engineering faculty are Government decisions on science and technology (62%), technical and scientific data (49%) and Health and Safety and also Management information (41%). One of the respondent expressed during the interview that

"I will follow up references cited in material consulted. I search for the source of knowledge of the references followed and at one time I use to take all the references in the used papers, but now I take references especially cited in survey and review articles." (R49)

6.2.1 BACKWARD CHAINING:

Following up reference was a major characteristics of the engineering faculty in information seeking patterns. 87% responded that they follow up the references, and believe that it is their principal means of gathering information. Backward chaining is a traditional information gathering behaviour in all academic disciplines (Ellis 1989)⁶. The engineering faculty agreed well with those of the social scientists. It was an important factor of their information gathering.

"Yes, I do follow up references, it is mainly through Journal papers and conference papers. It is my main method of following the materials to research." (R28)

"While preparing for a new topic for teaching, and while on some new research work, I follow up material consulted and references come across are the important source for my research work." (R72).

"I select those references which are quoted in a paper, which are most important and useful." (R112)
In response to the questionnaire 87% of the samples surveyed are following up references as their principal means of gathering information.

**6.2.1.1 DEGREE OF SUBJECTIVITY:**

References are followed up by respondents primarily on the grounds of relevance. Relevance determined by a judgment as to whether a reference seems to offer further explanation or not. As in making citations a degree of subjectivity applies to choosing citations to follow. 98% of engineering faculty members expressed that following up of references which are of interesting to them, and/or are relevant too and provided more information on their current work. The author and title, and context of the citation were used in choosing work to follow up.

"The potentiality of the articles and subject coverage of articles observed first. If the theme is useful to read further and I will verify the ideas with references then I will cite those which I used." (R48)

"The thought content of the articles which are related to my work are cited." (R56).

"I only follow up references in my particular area if I judge the information contained in it is worth following up and worth to cite in my paper or the author is renowned or from renowned institution or university publication." (R70)

"From the context of the paper, if the reference is full of background of the subject and same time I look into the references cited at the end." (R85)

The more structured and wide ranging subjective search activity of the faculty members had clearly mentioned that the large part of their research work involved in information seeking and gathering. The criteria for selecting references to follow up are dependent on the nature of the work being persuaded. In some
cases backward chaining is a part of the maintaining awareness activity.

6.2.2 FORWARD CHAINING:

Forward chaining relies on the use of specialised bibliographical tools. Forward chaining represents a very effective means of checking whether further work has been done which has cited material already known or consulted, but which has not come to the individual's notice through the other information seeking activities. It is the process of identifying citations of material with which the respondent is already familiar.

Survey has revealed that 96% of the respondents were engaged in the activity of forward chaining when trying to locate material. Table 6.9 and Fig. 13 are presenting this.

<table>
<thead>
<tr>
<th>TABLE - 6.9</th>
<th>IDENTIFYING CITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>use of</td>
<td>very useful</td>
</tr>
<tr>
<td>1. Abstracts and Indexing Journals</td>
<td>139(30%)</td>
</tr>
<tr>
<td>2. Current contents</td>
<td>39(12%)</td>
</tr>
<tr>
<td>3. Library Databases</td>
<td>280(40%)</td>
</tr>
<tr>
<td>4. Online Search</td>
<td>6(5%)</td>
</tr>
<tr>
<td>5. CD-ROM Search</td>
<td>90(40%)</td>
</tr>
</tbody>
</table>

The study reveals that 66% of the respondents were using Abstracting and Indexing Journals. Among these 30% of them expressed the Abstracting & Indexing Journals are very useful,
50% of them are said useful, 10% of the respondents expressed sometime useful.

Regarding usage of Current Contents for the activity of forward chaining was less among this group of respondents. 46% of members used this citation index. Recently, some R.E.C. libraries are getting this weekly information tool from ISI, Philadelpidia, USA; in computer diskette form instead of printed version. The information retrieval is more easy and user friendly. The use of Current Contents can be possible on local area network computer retrieval also. It keeps the faculty up-to-date every week. It is the source for identifying citation materials. The use of this citation index is less because the engineering faculty expressed that it does not contain abstracts. 22% of the respondents are unaware of this Current Contents and citation index. 18% are not regular users of the current contents, but occasionally they use this. It may be because of other substitute indexing journals available in their field.

Computerised library databases and catalogues have been used as the tools for identifying citations. 40% of them found the citations very useful to them and 50% of them have expressed the library databases are useful for identify citations in their work. 70% of them said, "sometime useful".

Engineering Index and its database COMPENDEX, Institute of Electrical and Electronic’s INSPEC database are the main sources for forward chaining by engineering faculty. These bibliographical databases are available on CD-ROM as well as on On-line. 32% of the respondents are aware of these databases on CD-ROM form. Only 18% of the respondents have used online
information retrieval during their research work. CD-ROM databases are available in many R.E.C libraries. The respondents find these citation indexes very useful for their research work. The existence of these citation indexes enables forward chaining to be undertaken relatively simple and some time with considerable success.

6.2.3 CLOSURE:

The making of citation involves a considerable degree of subjectivity, and citations may be made for a variety of reasons. It is not always the case that citations are considered important or even particularly relevant. The references from the original source can themselves be followed up and then again references followed up and so on, infinitum. This can rapidly collect material in a "Snowball effect", (Ellis, 1989). However at some stage a decision to stop chaining must be made, i.e. closure must occur.

"First I do search for my ideas associated with the references which I am reading. I will search for the thoughts or theme of the paper and then I will go further search of references at the end of the paper. From the content of paper if the reference is full of background of the subject covered, same time I look into the references cited at the end if findings are not relevant I will stop." (R50)

The most common reason for closure cited by the engineering faculty is that no relevant material existed before certain date. 48% of the engineering faculty expressed that they limit the follow up of backward references according to time. They prefer to follow more recently published research papers.

"I decide references on the basis of usefulness, relevancy and decency. Time is major factor to consider for referring early books and material for modern technology. My topic started only ten years back. If I search for
semiconductors about twenty years back nothing is available. I restrict myself to search recent ones." (R3) "I will select the references by their subject coverage and time limit for stopping them and acknowledge the authors." (R60)

"Currently working on 4 GLs in computer systems and analysis design what I did I refer for bibliographical information in library restricting to latest publications not later than five years because earlier to that the subject was not there at all." (R2)

6.2.4 CHAINING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

Forward and backward chaining can be undertaken using On-line services through the information retrieval databases. The retrieval systems designed for researchers should provide facilities for both backward and forward chaining. At its simplest the system should enable the searcher to examine lists of references in material thought to be of interest, the decision as to which citations to follow and to the extent to which citation chains were followed being left to the individuals. Simple enhancement to the basic backward and forward chaining facility might be provided to aid the searcher.

When asked about the usefulness of the On-line services and CD-ROM databases usage, only 32% of the respondents indicated that they are using this facility from the library. They find the results from this services are too much informative. However 68% of the respondents are unaware of these On-line and CD-ROM facilities.

"Provision of facility like On-line and CD-ROM’s for getting required relevant information is essential to our subjects. We need current and updated information in Mining engineering and Geology. The On-line services should be well provided to all research topics for convenience of research fellows." (R90)
"There are many information retrieval systems available on computer, electronics and electrical engineering where I can get information on advanced technology as well as latest development. I need such services where we can do the user network to my research work in many places in the institutes. It is hard to search information in Journals and conferences publications by me personally. Some speculative ideas and their information is necessary at the early stage of research through well linked information retrieval databases". (R77)

"There are too many Journals published. It is not possible to keep track on all these and get hold of good useful papers to my research field solid state physics. It is difficult to find out worth information from the published papers. Better automated information system is needed to retrieve specific information to those require it for the research purpose. The On-line and CD-ROM technology are the most useful tools for my research work". (R61)

The latest information technology usage has to be encouraged by the R.E.C. libraries on providing information services. The latest technology of CD-ROM and On-line information retrieval and networking of libraries through communication network like E-Mail and telecommunication will strengthen the usage of CD-ROM and On-line retrieval systems. By these techniques engineering faculty will be encouraged to get the needful information.

6.2.5 SUMMARY OF CHAINING:

Chaining is synthesizing the required information. Backward Chaining as an activity for following up references cited in material consulted was a technique employed by all the respondents surveyed. Forward chaining was a strategy engaged by almost 60% of the group, but was a far less regular approach. The level of awareness of forward chaining tools was not so high but did not include all the group. The criterion for selection of citations to chaining was determined by variety of factors.
These factors included the purpose of the search and the nature of research work currently being undertaken. Relevance was stated as the overriding criterion for chaining. Other important determining factors included title key words, abstracts, authors, personal recommendations of the source and general interest.

Chaining references is not exclusive to a particular stage in the engineering teachers work, but may be undertaken for starting or maintaining awareness. The breadth of approach for chaining citations is normally selected according to the variables mentioned in criterias above. To a certain extent automated information retrieval systems are offering a facility to follow chains of references for follow up particular references. These information retrieval systems have to be used more by the engineering faculty members.

6.3 BROWSING:

Browsing has several connotations. The major recognized forms of browsing can all be understood as representing forms of semi-directed or semi-structured searching of information in an area of potential interest (Ellis,1987). Browsing was used as means of maintaining and arranging information for use by the scanning of journals, current contents or books. The engineering faculty responded to browsing the content pages of Journals in a broad subject area, checked the periodicals received by themselves and received in their library or simply browsed along the shelves of library books and journals at regular intervals. Here browsing was used for initial starting or familiarisation,
to develop an awareness of sources and to keep up to date in their respective fields. Various methods of browsing are being used by the engineering faculty. Table 6.10 shows the browsing of the sources regularly.

### Table - 6.10

<table>
<thead>
<tr>
<th>S1. Browsing of</th>
<th>Total Response</th>
<th>Professors</th>
<th>Asst.prof.</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nos</td>
<td>%</td>
<td>Nos</td>
<td>%</td>
</tr>
<tr>
<td>1. Library Catalogues</td>
<td>466</td>
<td>66.5%</td>
<td>136</td>
<td>19.42</td>
</tr>
<tr>
<td>(including list of latest additions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Abstracting and indexing journals</td>
<td>458</td>
<td>65%</td>
<td>151</td>
<td>21.57</td>
</tr>
<tr>
<td>3. References from bibliographies and review literature</td>
<td>300</td>
<td>43%</td>
<td>151</td>
<td>21.57</td>
</tr>
<tr>
<td>5. Citations references in books, reports and periodical articles</td>
<td>363</td>
<td>52%</td>
<td>121</td>
<td>17.28</td>
</tr>
<tr>
<td>6. Announcements from publishers and booksellers</td>
<td>242</td>
<td>35%</td>
<td>83</td>
<td>11.85</td>
</tr>
<tr>
<td>7. Browsing in library shelves</td>
<td>291</td>
<td>42%</td>
<td>79</td>
<td>11.28</td>
</tr>
<tr>
<td>8. Browsing in bookshops</td>
<td>178</td>
<td>25%</td>
<td>61</td>
<td>8.71</td>
</tr>
<tr>
<td>9. Consulting Library Staff</td>
<td>257</td>
<td>37%</td>
<td>64</td>
<td>9.14</td>
</tr>
<tr>
<td>10. Other means</td>
<td>12</td>
<td>1.7%</td>
<td>8</td>
<td>1.14</td>
</tr>
</tbody>
</table>

Maintaining current awareness and updating information for information arrangement is found in Engineering teaching faculty as browsing activity of information seeking behaviour.
Table 6.10 depicts these activities as a total and individual cadrewise breakup. Library catalogue and latest addition list published by the libraries are found to be top of the service for information arrangement and providing Current Awareness Service among these teachers. 66.5% of the teaching faculty are utilizing this service. About 20% of the Professors, 16% of the Asst. Professors and 31% of the Lecturers have used these information tools for browsing and keeping them up-to-date. Abstracting and Indexing journals are also playing a pivotal role in keeping well informed and up-to-date for engineering faculty. 65% of the faculty members are browsing the Abstracting and Indexing journals for keeping informed and up-to-date. 21% of them are Professors, 18% of them are Asst. Professors and 36% of the Lecturers who are making use of these journals for arranging the information in an area of potential interest and developing awareness of sources of information.

Referring the bibliographies, review articles and citations from the books, reports and periodical articles are also found to the extent of 65%. Browsing in the Book shops, library shelves and consulting the library staff for latest arrival is also found in 37% of the teaching faculty.

The respondents are using Current Contents Journal as a browsing source regularly.

"Every time I will wait for the Current Contents Journal to search for some of the interested papers on my field. I will also scan some Abstracting Journals in library, but I prefer first Current Contents". (R30)

"I find Current Contents is useful source for keeping up-to-date in technology field. Its use is more, if it comes as computerised retrieval form i.e in diskette"
form. Our library is getting it. It is very easy to retrieve information on any interested topic. I like its updatedness". (R50)

"Browsing through latest arrivals in the field of electronic engineering have interested me to note down the recent papers. Among all Journals, Current Contents is providing latest information but it is not sufficient to me, I need abstracts of the paper". (R105)

By this study it is learnt that 46% of the respondents are using Current Contents regularly and 38% of the respondents are using this Journal occasionally. 22% of the respondents are not knowing what it is, and they are browsing through other means because they are not aware of the Journal Current Contents and its resourcefulness.

6.3.1 SEMI-DIRECTED AND SEMI-STRUCTURED SEARCHING:

Respondents indicated that semi-directed searching in an area of potential interest or browsing is an activity of the engineering faculty which can be drawn from several of the identified core categories. In starting process 68% of the engineering faculty stated that they would start looking for information on a new topic by doing literature search. The aim of the literature search would be to obtain abstracts and to browse those abstracts with the hope of finding relevant papers which could then be used as a basis for chaining references.

The browsing of database by retrieved abstracts as an information seeking activity was mentioned by 32% of the respondents. This type of browsing is similar to that described by Lancaster as 'Specific Browsing', which occurs "When a user makes a literature search through an index or bibliographic tool, but does not start with formal search strategy. The use in this
instance has some knowledge of intended direction of the search which is not casual or haphazard. The activity of specific browsing can then perhaps be linked to that engaged in the semi-directed and semi-structured searching at the initial starting process by the engineering faculty. Browsing was also used to identify material at the start of work on a new project. This was mentioned particularly if the engineering faculty had little or no previous knowledge of the area and the sources available.

"Go to library and do the literature survey from the indices available and read some review papers for the topic I started when it was new to me". (R30)

"Enough sources are there in library to see and to select for reading. I will identify some key references going through the indices, Journals and books. I collect all references which I feel useful to my research. That is how my chamber has become a reference library of my own". (R90)

About 28% of engineering faculty members have mentioned that they browse for interested information when they visit to some Research and Development units of industries and other sister concerned technical institutes like, Indian Institutes of Technology, Indian Institute of Science and other technological universities.

"Whenever I will go to research meetings or consultation work to industries I will visit their information centres and libraries and see their journals which are not in my institute library". (R80)

"As an examiner or board of studies member I will be visiting many universities and institutes, during that time I will visit their library, see some of the journals on my field". (R18)

"I receive many invitations from industries for consultations at that time I will visit their information unit which is having product profile of many industries and information on production by that I will get information for my students project work". (R10)
Due to the paucity of time many of the engineering faculty are not browsing many of the books and journals except Current Contents. However, browsing was seen valuable for the generation of ideas. Interestingly, some of them mentioned browsing in book shops.

"I will use the books review pages in newspapers every week for science and technology books. Whenever I will go to book shop I will see the contents of books and new arrivals in my subject field". (R20)

6.3.2 BROWSING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

Some of the engineering faculty have expressed desire to have an automated information retrieval system which has a "Browse" command which usually employed the term either to describe a facility to examine a set of references retrieved by a previous search, or to explore a portion of the indexing vocabulary on-line. Browsing of the abstracts produced by computer based information retrieval was not solely confined to the initial familiarisation process. 22% of the respondents mentioned an ongoing update on key words from computer database will help them to browse these on regular basis. This form of browsing is perhaps better understood as distinct from scientific browsing and can be categorised as technological and general purpose browsing. Browsing facility might be increased by the use of an automated indexing system. It may also be possible to enhance the facility by the provision of information derived from a statistical analysis of the database, perhaps in terms of citation linkages. This information analysis will be an aid to the searcher in his browsing activities.
6.3.3 SUMMARY OF BROWSING:

Browsing is a arranging the information sources according to needs. Due to scarcity of time 30% of the engineering faculty are not browsing much. Browsing as an arranging and awareness maintaining activity, was mentioned a description of scanning Journals as preferred method of keeping up-to-date. The browsing of journals was mainly confined to Journals which engineering faculty regarded as relevant. Browsing of Current Contents occurred in 46% of cases.

Simply browsing along the shelves of books and journals is not a real method of engineering faculty. Browsing mainly occurs when they are looking for new material for new project or for arranging information sources, references and keeping up-to-date by scanning regularly Journals and published literature in their field.

6.4 DIFFERENTIATING:

Ellis defines the concept of differentiating as an activity which uses 'differences between sources as filters on the nature and quality of the material examined'\(^{10}\). The activity of preferring the source to determine the factors influencing the choice of source selected by the respondent is the process of differentiating. The criteria which seemed to be most significant for differentiating material were

i) the topic of the study,

ii) the approach,

iii) the authors and

iv) the quality, level and type of source.
These differentiating features have been separated for the purpose of the analysis.

The samples under study were questioned in a variety of ways as to find their main, most important and particular important sources of information. For all categories of questions, Journals were the most important and favoured information source as shown in the Table 6.11.

**TABLE - 6.11**

**SOURCE PRIORITIZATION**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sources</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Journals</td>
<td>32%</td>
</tr>
<tr>
<td>2.</td>
<td>Books or monographs, encyclopedias</td>
<td>21%</td>
</tr>
<tr>
<td>3.</td>
<td>Research reports, patents, standards or trademarks</td>
<td>3%</td>
</tr>
<tr>
<td>4.</td>
<td>Abstracts and Indices</td>
<td>12%</td>
</tr>
<tr>
<td>5.</td>
<td>Current Contents</td>
<td>8%</td>
</tr>
<tr>
<td>6.</td>
<td>Bibliographic search service of databases done by Library through Online/E.Mail/CD-ROM/SDI</td>
<td>8%</td>
</tr>
<tr>
<td>7.</td>
<td>Informal discussions with colleagues at conferences</td>
<td>16%</td>
</tr>
<tr>
<td>8.</td>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Journals are the sources that emerged from the data as the source prioritised 32% by the engineering faculty in terms of importance and very useful source. The rationale for this selection arose from the need to stay up-to-date. Journals were thought as a suitable source for this requirement. Journals were
also perceived as valuable and efficient means of obtaining detailed latest information.

Other source prioritised were personal contact 16% in an informal capacity at conferences. The informal nature of conferences was considered more important than the formal aspect.

Books were considered valuable for general information, ideas and references. They were not given the same priority (21%) as Journal sources being viewed as out of date or not at the right level for research purposes. Evidence arose from analysis that books were rated quite high in terms of importance by the engineering faculty mainly for background information and general ideas. Books were considered important for undergraduate teaching purposes rather than research. Books do therefore provide an important source of information but two relevant factors must be taken into account to corroborate this statement. Firstly, books are thought valuable in a specific context, that of the learning or initial familiarisation process. Secondly, the type of book used by the engineering faculty is more often that of the textbook than a monograph or treatise. 22% of the respondents support this argument by specifying the type of book used.

This study reveals that 3% of Respondents mentioned the importance of Reference works, research works, Research reports, patents, standards or trade mark literature and thesis.

When asked for what was the most difficult problem they experienced in looking for material or keeping up-to date, 32% of
the engineering faculty expressed "Time". Hence they are busy with other works, they are not getting sufficient time to get the important sources of information. 28% of them expressed their inability for the enormous quantity of literature published.

"Time to read enormous literature published and get the required information is less. It will take long time to get hold of that information which I am looking for". (R11)

Given these results, filtering the material examined is of obvious importance. The criteria used by the engineering faculty for differentiating are: topic of the material; author; quality level and type of source; and time or period of publication.

6.4.1 DIFFERENTIATING BY TOPIC:

The most obvious form of differentiating is in terms of the topic of source. It is the process which is employed by the engineering faculty for identifying different sets of sources in terms of the differing probability contents of the useful material. The manner in which differentiation between sources or types of sources are effected, rather than differentiation in the fields themselves, are analysed here.

One way to filter material is by the topic of the source. Differentiation plays a role in selecting sources for monitoring. The members of engineering faculty were able to recognize the journals which were of particular importance in their fields and these were the measures in identifying relevant material. 13% of the engineering faculty are differentiating by topic in selecting the sources.

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"I am particular of the journals in my field—semiconductors and super-conductors. I directly go to Physics and Electronic Engineering Abstracts. Next to that is Physica - C, which provides me more information on semi-conductors, etc". (R21)

"Operation Research is the main Journal to my work and I recommend it to my research students to keep track of its arrival also for their reference". (R6)

From the study it is learnt 32% Engineering Faculty have mentioned that some institutional publications like IEE (Institute of Electrical Engineering, U.K), IEEE (Institute of Electronics and Electrical Engineering, U.S.A), ASME (American Society of Materials Engineering) and ASCE (American Society of Civil Engineering) are relevant and they are relying more on these publications, because they are published on topic-wise as transactions of institutes. Engineering faculty identify these sources specifically on a particular subject, which are regularly carrying material on a particular topic.

6.4.2 DIFFERENTIATING BY APPROACH:

Survey reveals that 14% of the engineering faculty differentiate sources by approaching particularly to the relevancy or the interest. Another 14% of them opined that the particular institute or society material as quality source. One has expressed that

"Industrial, Manufacturer's trade literature and manuals and their publications are more resourceful to me". (R10)

"ASCE: Structural Engineering Journal covers all the subject approach on my field. Usually I will keep the track of it. 90% of the references and subjects are of my interest here. I have published many papers in this Journal". (R122)
The filtering of sources for research in engineering is mainly based on differences in the disciplinary approach adopted. This approach adopted by engineering faculty is experimental, in conceptual interpretation or differences in their methodology in approaching for sources.

6.4.3 DIFFERENTIATING BY AUTHOR:

The data reveals that 11% of the engineering faculty mentioned that they follow the work of particular authors.

"I select some of the references by seeing authors to my Hydro-Geology research. I know who is doing qualitative work in my field. I search for their published papers first then I start seeing other works". (R90)

"While scanning through the Journals, I will see some expert authors contributed papers particularly who are famous in electro-magnetism field. I filter and select references by those authors and I regard so, as authoritative person in the field. I certainly look for their contribution to my field of research". (R18)

Referring by authors and choosing the papers by authors name involves credentiality of the author in the subject field. These measures of credibility involved respondents confidence in the author.

6.4.4 DIFFERENTIATING BY QUALITY, LEVEL AND TYPE OF SOURCES:

Study reveals 32% of the respondents have expressed Journal as one of their main sources of information. The Journal publications in Engineering have different reputations and there is frequently a good perception of the relative prestige or quality of Journals in an area. The differentiation of these sources employ to assess the probable quality of the material.

In engineering, the credibility or quality of published material was judged in part by the Journal source.
Differentiating in terms of quality was clearly made between the magazines and the Journals in the quality of material referred. The following engineering faculty indicated that they hold referred Journal in high regard.

"Two Journals I referred cover almost all in my subject. I am quite strict in selecting these qualitative Journals. These two journals have all aspects in our computer graphics field. Some Journals are of low standard and these are monotonous in publication and reserved for same authors and same content of subject". (R4)

"I prefer Journals and Journal articles in selecting the good quality Journals. In so many conferences the same articles are repeated in many ways either by the title change or by the adding some words. Actual quality of work we will not find in it. This is also true in some Indian Journals. But I find excellent quality articles or papers in some institutional publications Journals like IEE and IEEE proceedings or Transactions & Journals". (R41).

6.4.5 DIFFERENTIATING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

Differentiating is also possible on computer based information retrieval services to engineering faculty through online services. The database awareness for this was mentioned by 32% of the respondents. The databases COMPENDEX and INSPEC of on-line and CD-ROM are used frequently by faculty members through libraries which are having these facility.

The awareness and use promotion of databases and individual search availability on CD-ROM would increase usage of computer based retrieval facility. It is quicker and more efficient method of information seeking activities. Analysis of the differentiation for the types of sources by the respondents had shown that relevancy, quality and the convenience of obtaining the information as a main priority. The helpful
sequence of expert system designed for differentiating behaviour is desired by the respondents.

6.4.6 SUMMARY OF DIFFERENTIATING:

Differentiating means filtering the sources. The concept of differentiating between sources to filter material, on the basis of quality, level and type of sources are appropriate to engineering. The credibility of author, the particular Journal or the type of source were all important factors in determining the respondent's perception of the value of Information. It is not being assumed that in every case an engineering faculty wants to restrict the search to a limited type of source material. In the case of some of those involved in research work, differentiating a limited number of sources was not possible or was very difficult. The nature of their focus of interests was such that a large number of sources carried relevant or interesting material, and the individual could not be confident that this material would be picked up from a limited set of sources.

6.5 MONITORING:

The activity of monitoring is a "Process of maintaining awareness of developments in an area through regularly following particular sources," Ellis, 1987. Maintaining awareness refers to the pattern of activity employed by the respondents in order to keep up-to-date with new developments in their topic of research or the field as a whole. The continuous monitoring of developments in a field of study was an important part of the information seeking activity of many of the engineering faculty surveyed. They were principally interested in keeping up-to-date
in their own fields as well as on the subject as a whole engineering. The principal ways that engineering faculty used to monitor developments in their fields have been identified as Informal Contacts, Journals, Books, Conferences, Newspapers, Television, Industrial Reports, Manufacturer's Trade Catalogues and Computer Databases. These different ways of keeping up-to-date were not mutually exclusive for particular single source.

Individuals would frequently monitor Journals and rely on colleagues or associates to bring reference material to their notice, or attempt to monitor both Journals and industrial trade catalogues. The different ways of monitoring by the engineering faculty are explained here separately for the purpose of analysis. Table 6.12 and Fig.14 are depicting maintaining awareness.

**TABLE - 6.12**

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Informal discussion with colleagues</td>
<td>385</td>
<td>55%</td>
</tr>
<tr>
<td>2.</td>
<td>Journals</td>
<td>546</td>
<td>78%</td>
</tr>
<tr>
<td>3.</td>
<td>Reference works encyclopaedia, directories and books, monographs</td>
<td>280</td>
<td>40%</td>
</tr>
<tr>
<td>4.</td>
<td>Conference proceedings and Informal discussion at meeting or conferences</td>
<td>177</td>
<td>25%</td>
</tr>
<tr>
<td>5.</td>
<td>Teaching and Thesis Examining</td>
<td>133</td>
<td>19%</td>
</tr>
<tr>
<td>6.</td>
<td>Newspapers &amp; Television</td>
<td>140</td>
<td>20%</td>
</tr>
<tr>
<td>7.</td>
<td>Industrial reports and Trade literature</td>
<td>183</td>
<td>26%</td>
</tr>
</tbody>
</table>
MAINTAINING AWARENESS

FIG. 14

252
'Monitoring' is related to differentiating which is required in order to select the source. Sometime engineering faculty monitor a small number of sources very carefully and expect to find interesting material appearing in them fairly often compared to larger number that might be monitored to some extent less carefully or less frequently and which the probability of some thing coming up is correspondingly less.

The individual faculty differentiated the sources for material in terms of the likelihood of them coming up with useful or interesting material and if the interest change, the sources monitored may also change or some of those monitored may be monitored more closely.

Industries Research and Development centres special reports, manufacturer's trade catalogues and bulletin of research in progress have also served as a convenient means of keeping abreast of what is taking place in the technology.

6.5.1 INFORMAL CONTACT:

Monitoring informal contacts was an important source of information for 55% of the engineering faculty. A number of different concepts have been used to describe or expose the role of informal contacts in information seeking and communication, the most notable being part of the "Invisible Colleges" and that of "Technological Gatekeepers" to information exchange with particular reference to engineers, Allen (1977)\textsuperscript{12}. 32% of the respondents used informal contacts help them to keep up-to-date every day, 36% relied vary heavily on such informal contacts to
keep them abreast of developments weekly and other 20% stressed importance of such contacts fortnightly and 10% of them have awareness meet monthly. Informal contacts could be internal or external.

Informal contacts, could provide information relating to the engineering and technology research work carried in and around the respondent. They also provide information on the work of other members of the department in general, including interdisciplinary research programmes of the engineering field as a whole. This type of internal contacts will provide information for further research in the department.

"I rely on just listening to others in the department, and we have internal seminars once in fortnight. I am also in research group committee, we will have discussions on development in the metallurgy and materials field and we discuss on our topic of research and its development in the world". (R1)

"Being a member of professional institution and meeting all professional members in research committee I will have a discussion in detail with the intention to keep up-to-date in the field of fluid power control. (R11)

"Attending departmental seminars and guest lectures by internal and external members I feel to get information up-to-date and I discuss with colleagues and visiting fellows in detail about the topic and that keeps updated". (R8)

External contacts with many practicing engineer and faculty in the field of interest is providing information relating to technology, particularly in the case of institutional collaborations with other industries, research and developmental organizations. This is the major way of keeping up-dated.

"I am the executive committee member for Institution of Engineers, India local chapter, I had been invited to the
monthly meeting. While I will attend these meetings I discuss many problems of my research with them. They are also from various fields of engineering and pose many problems of science and technology. In the discussion we will sort out many practical problems. At the same time we will improve our knowledge with the latest development in engineering. Discussion with others will provide much more information to me. This type of meetings and contacts are providing up-dated information" (R49)

"Active research in practical field of engineering requires lot of contacts with experts and other members involved in research in the filed. I will contact many of them by Electronic Mail or by attending common meetings and inviting them for special lectures, having discussion with them keeps providing information required to me. Having discussion with industries people keeps me well informed in the field". (R47)

6.5.2 JOURNALS:

The engineering faculty interviewed have used Journals more for their current awareness. 78% of the respondents indicated that to keep up to date, they regularly monitored or attempted to monitor journals likely to carry relevant articles.

To engineering faculty, a principal way in which journal monitoring is carried out through the identification of a set of references which seem to publish material of interest frequently. In order to be effective some restriction has to be made on the number of sources monitored through the prior differentiation of a range of journals within their engineering field. Those who are working in an area for some time have usually identified a number of sources which regularly or consistently carry material central to their concerns. This form of monitoring has two aspects- Maintaining direct awareness of limited number of sources; and Indirect awareness of existence of other sources and of material in them, from references in the sources directly monitored.
"I use always IEEE Journals for my work. In these also I restrict to only three transaction publications which are coming to me. These are the standard and relevant to me. I follow these regularly". (R21)

Due to non-availability of time two engineering faculty members used the monitoring activities by their research students to keep up-to-date.

"My research students will inform me about the latest developments and the literature published in Journals during that period. I discuss with all of them making into three group call for discussion on current information in the field of their topic. They present the current information on manufacturing technology including the interested field of our research, and by that I keep awareness of my field". (R28)

"To save the time I requested my research students to keep track on some Journals and articles published in those Journals and also see the references on their research topic. Every time I will go through their selection of references and I take care that they select the relevant references to the topic". (R3)

6.5.2.1 CURRENT CONTENTS:

Current Contents weekly journal on Applied Science and Technology published by I.S.I., Philadelphia, USA, provides an alternative to scanning the actual Journals and would be expected to be particularly useful for Journals not available at their own college libraries. Among the respondents who used Journals for monitoring the 46% of the respondents have mentioned that they are using Current Content Journal— for factual information, and for updating knowledge. However, Current Content did not tend to be a regular part of the monitoring activities of 54% of the engineering faculty. 16% of them had never used it. 30% of them used it occasionally. 18% indicated that their use of Current
Contents was reduced because it is not covering abstracts of the paper and not easily available in the departmental library.

There were mixed opinions on the usefulness of Current Contents. More than 46% of the respondents are regularly using this Journal.

"I have been using this Current Contents for the last 8 years to keep up-to-date on papers published through Journals. It is not possible to get all the Journals to me as well as to our library. But I can get the information through Current Contents, what is published in all the journals. It gives me exhaustive information. It is very economical and time saving journal. It is useful to me". (R10)

6.5.2.2 ABSTRACTING AND INDEXING JOURNALS:

The data reveals that 65% of the respondents mentioned that they rely on abstracting Journals to provide awareness in the engineering field. They use particular subject abstracting and indexing Journals relevant to their area.

"I am getting metals abstracts every month and I will use this Journal for awareness of information and looking for developments in my field". (R81)

"We do scan the abstracting Journals of ASCE (American Society of Civil Engineers), when they arrive and make note of relevant references to our projects. These abstracts will give an idea of development in the field". (R55)

"I will keep up-to-date by reading through Analytical Abstract Journal on my field. It gives world wide development in chemistry and to my field of research". (R82)

"I used to go through Engineering Indexing Journals every time. But now it is coming in the form of CD-ROM. Now it is easy to get retrieved all the information for my project work on Internal Combustion Engines. But I don't have time to go to library and get retrieval the CD-ROM database of COMPENDEX". (R110)
About 6% of the faculty are involved in refereeing the journals and serve on the editorial committee of Journals. This provided a useful source of pre-publication information. Some caution was needed as the information was seen in confidence.

"I am the editor of a Journal, and I find much information about the developments in the different subject areas of engineering, including the one I am interested". (R60)

"Many Indian Journals and Conference paper publications are coming to me for referring and hence I am also in editorial board of these national publications, those provides lot of information on science and technology". (R16).

6.5.3 BOOKS AS MONITORING MATERIAL:

Monitoring through books, publishers list, consulting reviews on books or going through bibliographies of books like Indian National Bibliography (INB), British National Bibliography (BNB) and by checking new arrivals is used by 40% of engineering faculty to keep up-to-date. Standard texts, introductory manuals in books and hand books, monographs were used as the monitoring process.

"The sources for my work and to keep me up-to-date are mainly latest books and bibliographies which are arrived at library". (R40).

"Through reading, teaching, supervising project work keeps me up-to-date. Reading of latest books and seeing the publishers list and the books sent by the publishers for comments are providing information to me. Library provides me 'Latest Addition List', I will go through those and read new books. The handbooks series of publication which are published annually provides updated knowledge". (R11).

"The review articles and book reviews provide information about latest development in the field. I do read new arrivals of books at library." (R15)

"The handbooks and serial publications like annual
reviews are the source for me to provide awareness in this field of engineering". (R70).

About 16% of engineering faculty made no mention of usage of books and monographs for maintaining awareness.

"For current awareness I rely on abstracting and Indexing Journals rather than books, because the books provide outdated data or information which is not current. Books provide basic principles of the theory but for current awareness I rely on other sources like Journals". (R72)

"To see latest development in the books is not advisable to any research fellow. I recommend to go through the journals and other sources because books are not containing recent information required". (R20)

6.5.4 MONITORING THROUGH CONFERENCES:

Conferences helps as very important media of information. They present an opportunity for monitoring, learning about new areas, meeting new and existing personal contacts and for arranging collaborations. All agreed that the main value of conferences was the opportunity for personal contact and providing developmental information. This notion resembles with Herner (1954)\textsuperscript{13}, who found that pure scientists relied more on informal contacts than formal presentations at society meetings and conferences.

The favoured source for maintaining awareness, which was mentioned by 25% respondents was that of conferences and conference proceeding. Following faculty respondents have mentioned that conference provides awareness in many ways.

"I will go to conference to get awareness in my field by way of personal meeting with experts in the field and
discussing with experts in the field and discussing with them in detail about the development in the subject area. I will get conference proceedings which provides the literature source of the current development". (R10)

"Conferences are main sources to get involved in research and get latest information in field. I will attend three conferences annually". (R15)

"Attending conferences keeps up-to-date and we will get many opportunity to expose ourselves to many developments in the field of our research. I also follow through many conference proceedings which are received by library and to the department also". (R19)

6.5.5 TEACHING AND THESIS EXAMINING:

From the data 19% of the respondents have also mentioned that the examining of Ph.D. thesis and P.G. dissertation are the sources for monitoring. These can be useful as the latest, novel and current work. However, to be invited to examine a thesis the faculty must be eminent in the field. Similar to this is the valuing of undergraduate and post graduate project reports.

"I have been invited to examine the Ph.D thesis by many universities and from many colleges. These evaluated thesis works provide me awareness to the field". (R80)

"Being external examiner to many universities and institutes, I will get information through Ph.D. thesis evaluation". (R16)

Another minor source is teaching to under-graduate and post graduate students. At that time faculty has to keep up-to-date knowledge about subject as a whole.

"Students some time bring to me new ideas while teaching. In class room and in Laboratories, I must give the theoretical knowledge and its Practical use. During that time students will pose many live problems. To solve these I must keep up-to-date with development in my
field. Indirectly students will help me to be abreast of developed field of technology". (R11)
"Every year I will take new course for teaching in our department. The curriculum prescribed makes me keep up-to-date in the field, and while teaching I will get information about the developments in the field". (R20)
"Teaching keeps me up-to-date in all field of my interest". (R100)

6.5.6 NEWSPAPERS AND TELEVISION:

From this data 20% of the respondents used the newspapers as the occasional source to alert them to research or policy decisions. This was general technology information rather than information in particular subject areas.

"I see even newspapers and in particular science and technology column for knowing what is going on in my field". (R30)

"My problem of rural technology and energy systems is published in some newspapers and it is widely discussed there as the public needs and demands. The development of rural technology applications are published in newspapers and magazines. I will certainly go through these to keep up-to-date". (R119)

Some of the engineering faculty have mentioned that television plays a role of information source to their initial starting of projects and provides ideas to do research.

"Television media provides general information about robotic and from there I started my project on industrial use of robotic". (R12)

"Many of our problems are exposed by television which are medical electronics and instrumentation, and there are specialised programmes by UGC on educational technology. From there we can take many research projects which are useful for national developments". (R14)

6.5.7 INDUSTRIAL REPORTS AND TRADE LITERATURE:

From this study, 26% of the engineering faculty did not use sources in isolation but generally relied upon a combination
to keep up-to-date with a reliance upon industrial reports, manufacturer's trade catalogues and product exhibitions to get information. Here it is found that there is direct interaction between working engineers through industry and to the engineering faculty to get awareness of the sources for the development of knowledge.

"Trade literature of manufacturers provided to me while they are on consultation work. It is one of the information source to keep up-to-date. Discussion with them regarding their industrial problem gives lot of information". (R17)

"Using latest literature in technical reports of industries is the source for me to give project work for P.G. Students and take up industry oriented research work". (R41)

"Our department is taking up many consultation work from neighbouring industries. Lot of consultation work is entrusted to me from HOD. Meeting the people in industries and discussing the day today problems and looking to their reports will provide information to my projects". (R88)

"My research work is purely practical oriented means, it is applicable construction industry. Actually the architects and manufacturers are bringing these problems to me for consultation. At this point I have to see their product information. This provides latest information and awareness". (R49)

6.5.8 MONITORING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

The awareness level of computer based information retrieval systems to the engineering faculty is interesting evidence of monitoring. Many R.E.C. libraries are having On-line searching facility, CD-ROM facility of COMPENDEX and INSPEC database. Recently R.E.C's have been introduced to ERNET (Educational Research Network), which can be accessed each other library databases through E-Mail in some colleges.
The R.E.C. teaching faculty had access to on-line while they are doing Ph.D. and other quality Improvement Programmes at I.I.T's and I.I.Sc. and other developed research organisations like ISRO, NAL, NPL. It was difficult to determine whether the results have been useful for them or not.

"Many times I used this facility at Indian Institute of Science at the National Science Information Centre Bangalore, while I was doing Ph.D. but, I find results are not satisfactory, because of its huge retrieval of information which is sometime relevant". (R60)

"This on-line and CD-ROM search facility have been recently introduced in our college library. But my colleagues have yet to open their account there. What I feel is, it is definitely keeping us aware of information on our field of subject through keyword indexing retrieval systems. It provides useful references and most time saving. But it is too costly to our library". (R10)

"The bibliographical information provided through CD_ROM or on-line are almost identical. The references retrieved will provide world wide up dated knowledge on any topic. I feel it is the best way of updating the knowledge". (R53)

Only 22% of the respondents indicated that they were knowing about On-line and CD-ROM and its information retrieval facility. Even some of the colleges faculty as a whole have not responded for these questions. These are the colleges only under graduate courses are conducted and they are located at educationally backward area or they have started very recently.

This indicates that awareness concerning the availability of such information technology is not high. Even in cases where respondents are aware of the information technology, but the facility is not there in the college libraries.

The colleges like Karnataka Regional Engineering College, Surathkal, where the facility of On-line information retrieval
system and CD-ROM of COMPENDEX and E-MAIL through ERNET has been introduced the respondents are aware of the facility although they are not regular users. Respondents have opined as follows for the CD-ROM usage while they search their research topic of interest.

**TABLE - 6.13**

**USAGE OF CD-ROM IN KREC LIBRARY**

<table>
<thead>
<tr>
<th>Respondent No.</th>
<th>Topic of search</th>
<th>Date</th>
<th>Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>R - 49</td>
<td>Steel Structures</td>
<td>6-1-93</td>
<td>Good</td>
</tr>
<tr>
<td>R - 59</td>
<td>Structural Engineering</td>
<td>4-1-93</td>
<td>Satisfied</td>
</tr>
<tr>
<td>R - 62</td>
<td>Breaking Wave Force</td>
<td>11-1-93</td>
<td>No Comments</td>
</tr>
<tr>
<td>R - 92</td>
<td>Dams</td>
<td>11-1-93</td>
<td>It is must in present academic Environment</td>
</tr>
<tr>
<td>R - 112</td>
<td>Expert System</td>
<td>6-3-93</td>
<td>Very Good</td>
</tr>
<tr>
<td>R - 87</td>
<td>Oxidation Enzymatic</td>
<td>10-6-93</td>
<td>Good. It won't cover chemical aspects much</td>
</tr>
<tr>
<td>R - 59</td>
<td>Fly ash Cement</td>
<td>23-6-93</td>
<td>Good</td>
</tr>
<tr>
<td>R - 77</td>
<td>Radio isotopes</td>
<td>3-8-93</td>
<td>Enough information</td>
</tr>
<tr>
<td>R - 57</td>
<td>Allocation &amp; Network Flows</td>
<td>27-9-93</td>
<td>Excellent</td>
</tr>
<tr>
<td>R - 80</td>
<td>Mining : Reduce Analysis</td>
<td>10-2-94</td>
<td>Happy</td>
</tr>
</tbody>
</table>

CD-ROM users suggested for arranging the awareness camp of training course on these computerised information retrieval systems. 18% of respondents have evinced a high level of awareness who are doing research and have done their Ph.D. work recently. They preferred to use system independently, without any help from library staff. Practical experience of the computerised information retrieval facilities may well have been
lacking. To save the time of researchers on literature search task this computer based information retrieval system is a boon to them.

6.5.9 SUMMARY OF MONITORING:

Engineering faculty responses indicate that it is difficult to maintain regular monitoring of information. Information obtained through all these sources may then be integrated into the individuals overall information seeking behaviour employing different channels to complement or to form the major part of their information gathering activities.

The engineering faculty members prefer to employ conferences, conference proceedings, professional Journals and computer search update for monitoring. Major sources were personal contacts, conferences, and Journals, including Current Contents.

While assessing the professional Information needs and Information seeking behaviour the question was asked to respondents "What do you experience as the main problem in keeping up-to-date with the literature in your field?" All the respondents have answered this question. It is analysed that following main problems they encountered while seeking information.


90% of the respondents mentioned this as the main problem in keeping up-to-date in their field. The supporting reason for
this and also the another main problem faced by 40% of the respondents is budget provision to the institutes.

2. Lack of funds and budget allocation to library for procuring the information in the form of Journals and others.

Other than these there are other impediments in updating the knowledge.

3. Lack of time

78% of faculty have expressed that they are overloaded with the teaching work and other administrative work. The time required for getting awareness in the field of their interest to continue the research work is insufficient.

4. Geographical and political reason

Most interestingly 23% of the respondents have expressed the problem of keeping them up-to-date is geographical and political reason.

The areas are located at remote places like Srinagar in Kashmir and Silchar at Assam etc. The problems of Political Social and other disturbances are often faced. To reach the newly arrived Journals from abroad will take three months in India and then it takes further three months time if everything is smooth by post. But political disturbances causes lot of inconvenience to reach the latest technology information to concerned users.

18% of the respondents have expressed about lack of infrastructure in the library especially to arrange journals and
books. Much time is wasted in locating the books and Journals. This is a common complaint of the users regarding misplacement of books and Journals by the users themselves. This should not be neglected and one should not get hindrance in getting awareness.

In general it is found that there is lack of awareness about the Computer based information retrieval facilities among the engineering faculty. This requires an active publicity drive to promote the optimum use of such systems.

6.6 EXTRACTING

Extracting refers to the involved activity in finding information pinpointedly. The source may be an article in a periodical, a set of conference proceedings, a series of monographs, the contents of an archive, a collection of publishers catalogues or bibliographies, indices, or abstracts etc. The activity usually requires the setting aside of discrete and sometimes considerable period of time for working through the source. It is one of the most directed and focused information seeking activities, Ellis (1989) 14.

It is an act of going through a particular service selecting and identifying material from the sources. This may be when a researcher consults the source selected. These sources are normally a set of journals, series of monographs or collection of indices, abstracts and bibliographies, including computerised information databases.

The concerns of this category seeks to explore the use of library services; indexing and abstracting facilities,
computer based searching and to discover the respondents biggest problem in the activity of extracting.

6.6.1 USAGE OF PAPER BASED EXTRACTING TOOLS:

Just over 66% of all the respondents mentioned that they had made use of abstracts and indexing sources to locate focused information. 36% of the respondents had used library facilities to search the abstracts from the subject abstracting journals like Metals Abstracts, Analytical Abstracts or Engineering Index or through the On-line databases wherever available. 32% of the respondents had searched the Science Citation Index in a conventional paper back editions of journals and only 8% using the On-line information retrieval facilities. Strategies employed for the information seeking of paper based abstracts and indices, that were elaborated upon, mainly entailed usage of the author index in references to usage of the Science Citation Index.

Usage of Current Contents is high and majority are aware of its existence and found it as useful tool to them.

"I use Current Contents exclusively to locate my search interest and focus on it every week because it is very useful. It allows to keep up-to-date and send off for papers before the library even get them in original Journals". (R52)

6.6.2 SEARCH DELEGATION:

While extracting the information respondents have indicated that they found it difficult to maintain regular focusing on some sources then they feel like delegating the task of searching work to others. The delegation of information search
on particular relevant references is made.

While seeking information on relevant references faculty members have to extract from sources available. The extracting from exact source from each faculty for particular source and keeping track of that reference tool some time is not possible due to time shortage or engaged in other work or so. In such cases the faculty will delegate the searching task to others.

The study reveals that 39% of the faculty will delegate the searching information to others. The Fig. 15 represents the delegations of information search strategy.

From the study it is learnt that 273 (39%) of respondents delegate the work of extracting information amongst that 45% of the faculty will delegate information extracting occasionally, and 39% of the respondents are delegate moderately, 6% of the respondents are delegated frequently. 10% of the respondents delegate the information search completely to others. The present study reveals that the reason for delegation of search task is mainly time. 48% of the respondents have mentioned that they don’t have time to keep track of the sources for searching and extracting the information, hence they over burdened with other responsibilities. 41% of the faculty respondents have expressed that they are training others to search for information. Especially research students are entrusted their work of searching and keeping track of information. This encourages the team or group members involvement. Fig.16 represents the reasons for search delegation.

From the data 5% of the samples expressed that they find others are not familiar with the sources of information which
DELEGATION OF INFORMATION SEARCH

FIG. 15
they need, so they will not delegate their work. 4% of the faculty feels that this task of information search and extracting is a tedious and monotonous job, others will do it properly and leaserly, that is why they delegate information search and extracting work to others.

The delegation of search is done for the retrospective search, 10% current search 15% for particular document, literature on its topic and 25% of the respondents search for factual data of a report or standards.

From this study 427 respondents (61%) were indicated that they do not delegate the search strategy to others for the following reasons, as shown in Table 6.14.

**TABLE - 6.14**

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Respondents %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do not have assistance</td>
<td>51.35%</td>
</tr>
<tr>
<td>2. Find it difficult to communicate my information</td>
<td>2.7%</td>
</tr>
<tr>
<td>needs to others</td>
<td></td>
</tr>
<tr>
<td>3. Do not believe in others collecting information</td>
<td>18.11%</td>
</tr>
<tr>
<td>for me.</td>
<td></td>
</tr>
<tr>
<td>4. Find it difficult to train others in my ways</td>
<td>1.08%</td>
</tr>
<tr>
<td>of collecting information</td>
<td></td>
</tr>
<tr>
<td>5. I believe the searching process is as important</td>
<td>25.14%</td>
</tr>
<tr>
<td>as information itself</td>
<td></td>
</tr>
<tr>
<td>6. Other reasons</td>
<td>1.08%</td>
</tr>
</tbody>
</table>

The study reveals that 61% of the total respondents are not delegating the searching of the information for their use.
Because the main reason is that they do not have any assistants to do this work (51.35%). Among the non-delegating population survey 2.7% of them will find it difficult to communicate their information needs to others because they have their own choice or interest. 18.11% of them do not believe in others collecting information for their sake. 1.08% of them will say that it is difficult to train others in ways of their own. 25.14% of them said that searching process is as important as information itself, that is why they do not delegate this work. Fig.16 presents the ratio of reasons for not delegating the search.

Following respondents have expressed their opinion on how and why they are going for delegation of search.

"I rely on research students to search the information on particular project and believe that they tell me interesting things". (R60)

"Yes, certainly I delegate the powers to search on behalf of me, because first of all I am not getting ample time to search and I have trained my research students how to get the information". (R71)

Skelton’s comparative paper in 1973 determined that scientists tended to delegate their searching activity. This was only found to be true, as described, amongst the more senior members of the engineering faculty who did not, by any means rely on delegation of searching for their information retrieval. In the light of Skelton’s assertions it is perhaps important to qualify the extent of search delegation in these terms15.

6.6.3 EXTRACTING AND COMPUTER INFORMATION RETRIEVAL SYSTEM:

The database that was mentioned most frequently searched on a computer information retrieval system was that of COMPENDEX
REASONS FOR SEARCH DELEGATION

- LACK OF TIME
- TRAINING OTHERS
- TEDIOUS JOB
- NOT FAMILIAR
- OTHER REASONS

FIG. 18

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(Computer based Engineering Index, USA) with abstracts being mentioned many times by respondents. And next to compendex is the INSPEC (IEE & IEEE database). The usefulness of these computer based searches varied, several of the respondents expressed the view of that the products were in some senses too useful, providing too many references that were not relevant. The view of usefulness was, therefore, that the searches were indeed valuable but it was essential to choose the right exculsions, pinpointed one to avoid irrelevance.

"Yes if you pick the right pinpointed exculsion and KEYWORDS and you can get something that's may be 70% to 80% relevant. You can get some fascinating articles that slip through the information system. Usually much more fascinating than the ones you have got on file". (R27)

The usefulness of the CD-ROM database searches were therefore high amongst the respondents. The On-line searches of databases requires some more practical training and awareness. The lack of awareness of the available databases themselves leads to decline in wage.

The above analysis posed an interesting question concerning the awareness level of the engineering faculty and of computer based retrieval systems. Only 32% of the respondents indicating that they were at all knowledgeable about CD-ROM and On-line information retrieval facilities. The dominant strategy employed for computer based searching was by the use of key words. Even though knowledge of the databases available for searching was limited, the retrieved information by keywords found relevant and useful.
6.6.4 SUMMARY OF EXTRACTING:

Identifying the potentially useful sources of material is a critical prerequisite to extracting from the sources. If a key source or key sources can be identified then source or sources may provide the basis for much of the engineering faculty information seeking activities. Extracting from journals can represent a very effective means of quickly identifying material on a topic, especially if the source used is perceived as standard for an engineering field. The use of newly published books form has its complement in extracting. The availability of subject bibliographies, abstracting and indexing in engineering field on a particular topic or the existence of a database service with exactly the right focus for the individual concerned represent obvious criteria for engineering faculty to employ these kinds of sources for extracting.

Awareness of computer based information retrieval facilities for extracting activities and active publicity drive to promote these facility would give a greater usage among the engineering faculty. As the approach to computer based information retrieval was favourable with respondents expressing the views that use of such facility was time saving and useful for focussing and pinpointedly picking up of material which is relevant.

6.7 SUMMARY:

In this chapter the data collected is analysed in the light of the questions asked in questionnaire and on the bases of
the interview. In general Ellis model is taken as the base to the study. The total concentration is on his categorisation with reference to the Engineering Faculty in R.E.C’s. It is observed that there is a considerable amount of deviation in Information Seeking Behaviour from Social Scientist to Engineers and Technologists. Considerable attempt is made in this chapter to delineate the differences to establish the Ellis model as the suitable model for assessing the Information Seeking Behaviour of Engineering Faculty.

REFERENCES:

2. Ibid.
3. Ibid.
5. Ibid.
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10. Ellis, D, op.cit.pp.171-212.
11. Ellis, D, op.cit.pp.171-212.
