3.1 Introduction

The completion of research work is associated with a series of various steps. These include formulating the research problem, extensive literature survey, developing the hypotheses, research design, collection and analysis of data, hypotheses testing, interpretation and finally presentation of the results and conclusions (Kothari, 2004). The first step after the formulation of problems is to design the research. It is the complete plan of a researcher to answer the research problems. A research is an arrangement of conditions for collection and analysis of data in a systematic manner that combines reference of the research purposes with economy in procedure (Tandon, 1979). The research design is needed because it facilitates to carry out various research operations, thereby making research more and more efficient as possible to get maximum information with less expenditure of effort, time and money. That is why research design differs from research purpose. “The use of qualitative method has long tradition (1900-20) in psychology as well as in social sciences” (Flick, 1998).

“A research design is a plan of the proposed research work”. Research methods are basically related with observation of reality, defining the problem and its dimensions, a planned approach towards analysis of the research problem, interpretation of information and drawing conclusions” (Ghosh, 2010).
Survey method is the long tradition in the social sciences. This method is the most frequently used mode of observation in the social sciences. The survey method relies on a questionnaire tool and it is the most common method used in social science research (Babbie, 1995). A sample is used in the survey method that is representative of a larger population and uses the results to generalize about the population as a whole (Gutheric, 2010).

A definite method is to be used for the collection of data from respondents by means of survey in any discipline. There are various options that are available for data collection in library and information science viz. citation analysis, questionnaire tool, interview, telephone interview and diary methods. The questionnaire and interview methods are the most popular methods among all these methods.

3.2 Locale of the Study

Geographically, this study is confined to the state Universities of Haryana, Punjab and Chandigarh excluding the deemed universities/ deemed to be universities. Accordingly, the following universities have been taken up, for collecting the data and to study the use of e-resources by the faculty members, research scholars and postgraduate students of chemistry and physics:

Kurukshetra University, Kurukshetra

Ch. Charan Singh Haryana Agriculture University, Hisar
Ch. Devi Lal University, Sirsa
Gurunank Dev University, Amritsar
Maharishi Dyanand University, Rohtak
Punjab University, Chandigarh
Punjabi University Patiala

These universities undertaken in this study have been taken on the basis that they are running postgraduate courses in Physics and Chemistry. At the time of collecting the data it was found that CCHAU, Hisar was not running MS.C Physics, so that this particular university has been excluded from the study. Similarly, the study is confined to use of e-resources, whereas Ch. Devi Lal University, Sirsa is not subscribing any e-resource, that's why this University has also been excluded from the present study.

3.3 Data Collection

The method of collecting the data is very important after the problem is defined and research design has been chalked out. There are various methods for collecting the data. The most appropriate method in this type of study is survey method because using survey method we can evaluate the background of the users, their experience and the kind of knowledge they have about electronic information.

In the present work, questionnaire tool has been used to obtain data and the data has been standardized for comparison. Keeping in mind the objectives of the study for
collecting data from different users, the questionnaire was designed according to the problem. Two questionnaires were made to collect data for the study, one for users of chemistry and physics department and another for librarian of the concerned universities. The questionnaires were administered among faculty members, postgraduates and research scholars of chemistry and physics department. The questionnaires were administered in classrooms, central library and hostels to get the response.

3.4 Sampling

There are various methods to determine the sample. In the present work, the investigator has used stratified sampling method. A total number of 712 users of both chemistry and physics disciplines taken from the selected universities. A total 346 questionnaires were distributed among the users of chemistry with a response of 285. On the other hand, a total 366 questionnaires were distributed among users of physics and 304 were received back. The total response has been depicted in the following tables:
Table No. 3.1 University-wise distribution of Questionnaires

<table>
<thead>
<tr>
<th>Questionnaires Distributed</th>
<th>KU, Kurukshetra</th>
<th>MDU, Rohtak</th>
<th>PU, Patiala</th>
<th>GNDU, Amritsar</th>
<th>PU, Chandigarh</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires Received</td>
<td>100</td>
<td>150</td>
<td>145</td>
<td>207</td>
<td>110</td>
<td>712</td>
</tr>
<tr>
<td>Questionnaires Received</td>
<td>90</td>
<td>125</td>
<td>114</td>
<td>164</td>
<td>96</td>
<td>589</td>
</tr>
</tbody>
</table>

Table No. 3.2 Users-wise distribution of Questionnaires

<table>
<thead>
<tr>
<th>Users</th>
<th>Questionnaires Distributed</th>
<th>Questionnaires Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemists</td>
<td>346</td>
<td>285</td>
</tr>
<tr>
<td>Physicists</td>
<td>366</td>
<td>304</td>
</tr>
<tr>
<td>Total</td>
<td>712</td>
<td>589</td>
</tr>
</tbody>
</table>

3.5 Sources of Data Collection

To study the use of e-resources by the chemists and physicists, the following sources were used to collect the data:

- Library websites/home page of the Universities.
- Annual reports and brochures of the Universities.
- Questionnaire filled up by the users and librarians.
3.5.1 Problems Encountered

In order to collect the data using survey method, one has to undergo a lot of hardships. The faculty in a university being busy in their teaching as well as other academic responsibilities showed disinclination to fill up the questionnaires, but due to repeated personal visits, response received from faculty is appreciable. Once the questionnaires were distributed, two or three visits had been made to get back the completed questionnaires. The research scholars and postgraduate students showed keen interest in filling up the questionnaires as compared to faculty members.

3.6 Statistical Techniques Used for Data Analysis

The collected data has been analyzed with the help of (SPSS) Statistical Package for Social Sciences (16.0 version). Statistical methods like percentage and Chi-Square were used. These tests were used with .05 level of confidence.

The $x^2$ test was first used by Karl Pearson in the year 1900. The $x^2$ test is one of the simplest and most widely non-parametric tests in statistical works (Gupta, 2002). The equation for Chi-Square ($x^2$) is stated as follows:

$$x^2 = \sum \frac{[fo - fe]^2}{fe}$$
Here, $f_o$ is frequency of occurrence of observed or experimentally determined facts. $f_e$ is expected frequency $f_o$ occurrence on independent hypothesis. The difference between the observed and the expected frequencies are squared and divided by the expected number in each case, and the sum of these quotients is Chi-Square ($\chi^2$). The more closely the observed results approximate to the expected, the smaller the chi-square and the closer the agreement between the observed data and the hypothesis being tested. Contra wise, the larger the Chi-Square ($\chi^2$), greater is the probability of real divergence of experimentally observed from expected results. (Garrett and Woodworth, 1981) Degree of freedom: Number of data that are given in the form of a series of variables in a row of column or number of frequency that are put in cells in a contingency tables, which can be calculates is called degree of freedom. The formula for calculating degrees of freedom ($df$) is: $df = (r-1)(c-1)$ (Arora et al., 2007).

\[
df = \text{Degrees of Freedom} \\
\quad r = \text{Number of rows in which data tabulated} \\
\quad c = \text{Number of column rows in which data tabulated}
\]
3.7 Citation Style

Citation or the reference part of the study is based on APA style using endnote software. A bibliography, as a necessary component of the research work, provides an alphabetized list of all of the sources that were used and consulted in the completion of present study.
References


