3.1 Research design
3.2 Sampling procedure
3.3 Variables and their Empirical measurement
3.4 Collection of Data
3.5 Statistical tools used for analysis of data

3.1 RESEARCH DESIGN

The design of research is the most important and critical aspect of research methodology. In a broad sense, research design is the process of planning and carrying out research. A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to research purpose with economy in procedure (Kothari, 2008). It constitutes the blueprint for the collection, measurement and analysis of data.

Analytical Research design was used in this study. Analytical designs are concerned with testing of hypotheses and specifying and interpreting relationship of the variables. They concentrate on indepth analysis of data and examine relationships from various angles by bringing as many relevant variables as possible (De and Jirli, 2015).

3.2 SAMPLING PROCEDURE

3.2.1 Locale of Study: Uttar Pradesh was selected purposively as this state is having highest number of Agricultural Institutes.

3.2.2 SELECTION OF AGRICULTURAL EDUCATIONAL INSTITUTES

There are four state agricultural universities and two central universities with agriculture faculty in Uttar Pradesh. Two State Agricultural Universities and one Central university with Agricultural faculty was randomly selected for the study.
3.2.3 SELECTION OF RESPONDENTS

Research scholars in agriculture from each selected university were the respondents of the study. Seventy questionnaires were distributed at C.S. Azad University of Agriculture and Technology, Kanpur out of which 50 completed questionnaire were received. Similarly, 65 questionnaires were distributed at N.D.University of Agriculture and Technology, Kumarganj, Faizabad, out of which 50 completed questionnaires were received. At Institute of Agricultural Sciences, BHU 120 out of 150 questionnaires were received, thus making total of 220 respondents.

3.3 VARIABLES AND THEIR EMPIRICAL MEASUREMENT

Based on available literature and opinion of the experts in the field of Extension, the following variables were selected for the present study. The variables selected and their empirical measurements have been furnished in the Table 3.2, as below:
Table 3.2 Empirical Measurement of Variables Selected for the Study

<table>
<thead>
<tr>
<th>VARIABLES AND THEIR EMPIRICAL MEASUREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S.NO</strong></td>
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<td>A.</td>
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Operationalisation of variables and measurement

A. Independent variables (Socio-personal variable of research scholars)

a) Sex:

It refers to the biological differences of the respondents. It was recorded in terms of male and female.

b) Age:

It refers to chronological age that is number of years completed by respondents at the time of Investigation. The respondents were categorized into 3 groups based on the average age and standard deviations (S.D.) values as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 23</td>
<td>&lt;Mean-S.D.</td>
</tr>
<tr>
<td>24 to 27</td>
<td>Mean±S.D.</td>
</tr>
<tr>
<td>28 and above</td>
<td>&gt;Mean±S.D.</td>
</tr>
</tbody>
</table>
c) **Medium of basic education:**

It refers to the medium of instruction at school level from where the students have studied. It was measured in terms of English, Hindi or Other Language.

**d) OGPA in Post Graduation:**

It refers to the OGPA obtained by the individual respondent in Post Graduation. Direct questioning was the method of ascertaining it; the respondents were categorized into 4 OGPA groups based on the frequency of the respondents.

**e) Family Background:**

It refers to the residential location of the family of the respondents. It was measured in terms of Rural, Semi-urban and Urban.

**f) Department:**

It refers to the department in which the respondent is enrolled at the time of data collection.

**B. Dependent variables**

1. **Usage:**

Usage is defined as the way that something is being used, or to the proper way to make use of something such as a word or phrase or tool. It were studied in terms of the knowledge about e-resources, sources of accessing E-resources, types of E-resources accessed, frequency of using E-resources and purpose of using e-resources.

**C. Problems:**

It refers to the constraints faced by the respondents while using and accessing E-resources.

**3.4 COLLECTION OF DATA**

**3.4.1 Framing of Questionnaire**

The main method for data collection used in the study was questionnaire. A pair of questionnaire (one for data collection from Research Scholars and another for data collection from librarians) was drafted for this purpose. Accordingly to Drew (1980) “A questionnaire must be constructed in such a manner that it will extract accurate information from the
3.4.2 Nature & Methods of Data Collection

Good rapport was established with the Research scholars and Librarians by convincing the purpose and importance of the study. This study was based on the information obtained through primary data. The data were collected by administering the final well structured & pre tested questionnaire (Appendix-I) to the research scholars and librarians. It was made sure that the questions were correctly understood by the research scholars and librarians.

3.5 STATISTICAL TOOLS USED FOR ANALYSIS OF DATA

Statistical method is the scientific method of judging collective natural or social phenomena from the results obtained by the analysis or enumerated or collected estimates (Siegel, 1956).

To convert the data into meaningful findings, the following statistical tools were used; Arithmetic Mean ($\bar{X}$), Standard Deviation (σ), Frequency ,Percentage, Correlation (r) and Chi- Square test ($\chi^2$)

3.5.1 Arithmetic Mean ($\bar{X}$)

It is defined as the sum of all the values of observation divided by the total number of observations. Symbolically it is represented as $X$.

Arithmetic Mean ($\bar{X}$) = ($X_1+X_2+X_3$……+$X_n$)/n

Arithmetic Mean ($\bar{X}$) = $\sum_{i=0}^{n} X_i$ /n

Where $\bar{X}$ = Arithmetic Mean

$\sum_{i=0}^{n} X_i$ =sum of all observations

n = Total number of observations

3.5.2 Standard Deviation (σ)

It is positive square root of the mean of the squared deviations taken from arithmetic mean. It is represented by the symbol σ.

Standard Deviation (σ) = $\sqrt{\frac{1}{n} \left[ \sum X_i^2 - \frac{(\sum X_i)^2}{n} \right]}$
Where, $\sum X_i^2 = $ Total sum of square of the observations.

$(\sum X i)^2 = $ square of sum of observations.

$n = $ Number of observations

### 3.5.3 Frequency and Percentages

Frequency distribution and percentages were used to know the distribution pattern of respondents according to variables.

Percentages were used for standardization of sample by calculating the number of individuals that would be under the given category.

### 3.5.4 Correlation (r)

Correlation coefficient was used to find out the relation between the variables. This was used to calculate ‘r’ value which facilitated to know the strength of the relationship between dependent and independent variables.

### 3.5.5 Chi- Square ($\chi^2$) test

The collected data has been analyzed with the help of Statistical Package for Social Sciences (SPSS, 16.0 version). Chi- Square was used with .05 level of confidence.

The $\chi^2$ test was first used by Karl Pearson in the year 1900. The $\chi^2$ test is one of the simplest and most widely non-parametric tests in statistical works (Gupta, 2002).

The equation for Chi-Square ($\chi^2$) is stated as follows:

$$\chi^2 = \sum \frac{(fo - fe)^2}{fe}$$

Here,

$fo = $ frequency of occurrence of observed or experimentally determined facts.

$fe = $ expected frequency, $fo$ 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 (d.f.):** 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 calculated is called degree of freedom. The formula for calculating degrees of freedom (d.f.) is: $d.f. = (r-1) (c-1)$ (Arora et al., 2007).

- d.f. = Degrees of Freedom
- r = Number of rows in which data tabulated
- c = Number of column rows in which data tabulated