CHAPTER III

METHODOLOGY

3.1 INTRODUCTION

Research is a search for truth and it is the result of the ever continuous enquiring mind of the human being. Man is endowed with a sharp intellect and is search of new vistas of knowledge, which leads him to discoveries and invention. Truth which pervades the Universe is perpetually discovered by the mind of man; he is an incessant searcher for new facts and theories and is continuously researching in the environment and in himself. Basic sciences have in them, an inbuilt system for specifics and verifiable facts; new facts are accepted by the researcher only when the findings of research are proved.

Research is born out of man's problems and man's behaviour is always problem solving behaviour which is universal in character. Life is a full of problems and the solutions of which demand research approach. A scientific research approach is nothing but formulating hypothesis to the particular problem, selecting appropriate tools and samples, data collection, data analysis, interpretation and conclusion. In this process of research, selecting the problem is a problem for any researcher and it is a prerequisite for him. Many problems need solutions with variables such as time, place, costs, administration, organisation, teachers, learners, methods of teaching and curriculum.

Generally, research is classified as either basic research or applied research. This classification is based on the objectives or purposes the
researcher intends to accomplish. Basic research is primarily concerned with the formulation of a theory or a contribution to the existing body of knowledge. This research is also known as pure or fundamental research. It represents a rigorous and structured type of analysis. It employs careful sampling procedures in order to extent the findings beyond the group or situation and thus develops theories by discovering proved generalisation or principles.

Applied research on the other hand, is directed towards the solution of immediate, specific, and practical problems. It is performed in relation to actual problems and under the conditions in which they are found in practice. It uses the scientific method of enquiry. Applied research is also designated as action research.

3.2 METHODS OF RESEARCH

According to Oxford English Dictionary, 'Method' means a way of doing something and the quality of being well planned and organised and the term 'Methodology' means a particular system of methods.

Research is the most important, essential and powerful process for advancing knowledge and promoting progress. A sound and effective methodology is required for a good research. The success of research and its findings largely depends upon proper methodology adopted in the study. Methodology describes the various steps of the plan of attack to be adopted in solving a research problem, such as the manner in which the problems are formulated, definition of terms, the choice of subjects for investigation, the
validation of data-gathering tools, the collection, analysis and interpretation of data, and the processes of interferences and generalisation.

All educational research can be classified and categorised in one or combination of the following methods.

- **Historical method**: which provides a method of investigation to discover, describe and interpret what existed in the past.

- **Descriptive method**: which provides a method of investigation to study, describe and interpret what exist at present.

- **Experimental method**: which provides a method of investigation to describe basic relationships among phenomena under controlled conditions?

In fact these three methods deal with past, present and future. In recent years, debate in human and social sciences researches expresses two fundamental paradigms of research. They are-

- **Quantitative research**

- **Qualitative research**

Research traditions and method, which were initially developed in the physical and natural sciences, had been used as models for educational research, to a large extent. Such a model is called **Quantitative** or **Conventional, Traditional** or **Positivistic** research. Experimental psychologists have attempted this research model in behaviour sciences at the first instance and found the model, effective for research.

Another research paradigm that has gained acceptance for the past twenty years, developed by anthropologists and sociologists, is usually called,
qualitative, naturalistic, ethnographic, and subjective or post positivistic inquiry. Qualitative research is derived from the humanities with an emphasis on holistic and qualitative information and to interpretative approaches.

3.3 RESEARCH METHODOLOGY IN CONSIDERATION OF THE PRESENT STUDY

The selection of a method and specific design within that method appropriate in investigating a research problem will depend upon the kind of data that the problem entails. The present research is designed to obtain pertinent and precise information concerning current status of phenomena and to draw valid conclusion from the facts discovered. As such the present study belongs to descriptive type of studies. A brief description about descriptive method may be given below.

3.3.1 The Descriptive Method

The descriptive method is that type of research which tries to study the phenomena in their natural setting concerning their present status of affairs. Descriptive research is also called normative research which is used to describe current condition without their being influenced by the investigator. According to Kaul (1988) descriptive studies collect and provide three types of informations, (a) of what exists with respect to variables or conditions in a situation; (b) of what we want by identifying standard or norms with which to compare the present conditions or what experts consider to be desirable
and (c) of how to achieve goals by exploring possible ways and means on the basis of the experience of others or the opinion of experts. Descriptive research has been classified into three categories viz,

a) Survey studies

b) Interrelation studies

c) Development studies

By looking into the nature of the study, the type of data collected for the present study and the procedures followed to collect them normally puts the study under descriptive or normative survey method.

The word “survey” indicates the gathering of the data regarding current conditions. The word “normative” is used because surveys are frequently made for the purpose of ascertaining which is the normal or typical condition or practice. Survey studies are conducted to collect detailed descriptions of existing phenomena with the intent of employing data to justify current conditions and practices or to make more intelligent plans for improving them. Surveys are concerned with conditions or relationships that exists, practices that prevails, beliefs, points of views or attitudes that are held, processes that are going on, effects that are being lift or trends that are developing. In short, we may say that survey describes and interprets what exist at present.

Again, in the present study, a harmonious combination of quantitative and qualitative research had undertaken for the problem of investigation. This combination provides answer to research question in its completeness or totality.
3.4 AREA OF THE STUDY

Considering the feasibility of the study among the adolescent boys and girls, the area of the present study is chosen by the investigator is the metropolitan district of Kamrup (urban) and Kamrup (rural) District of Assam. However, the sample strength confines to boys and girls of class XI and XII standard of Higher Secondary Schools, Junior Colleges and Colleges of the district (undevided) only.

3.4.1 A Brief Sketch of Kamrup District

Kamrup district is an administrative district in the state of Assam in India, named after Kamrupa, a name by which Assam was previously known in ancient times. The district however is now a small western part of Assam, with a distinct native Kamrupi culture and dialect (both known as Kamrupi). Kamrup district consists of wide plains through which the mighty river Brahmaputra makes its way flowing a steady course from east to west. The demographic pattern of Kamrup District is a heterogeneous one. However, there exist a perceptible degree of mutual love, respect and inter-religious tolerance amongst them.

Since 2005, the pre-divided district has been subdivided between the Kamrup (metropolitan) and Kamrup districts, the former comprising of the metropolitan city of Guwahati and the later the rest of the district. Both the districts are taken together as undivided.

The undivided Kamrup district is situated between 25.43° and 26.51° North Latitude and between 90.36° and 92.12° East Longitude. The district is
bounded in the north by foot hills of Bhutan and Nalbari district, south by the
state of Meghalaya, east by Nagaon and Darrang district and in the west by
Goalpara and Nalbari district. Kamrup district falls under lower Brahmaputra
valley zone. Total geographical area of the district is 4345 sq.km (4,34,500ha)
viz. 5.5% of the total geographical area of the state. The major rivulet in the
north bank starting in the Bhutan is Puthimari drain at the Brahmaputra. The
rivulet in the south bank viz., Boko, Kulsi, Singra, Bharalu and Digaru started
at Meghalaya and drain water at the Brahmaputra River.

Kamrup district is well connected by airways, railways and roadways
to different parts of the country. National highway 31, 37, 40 and 56 passes
through the district. North East Frontier Railways have its divisional
headquarter at Rangia. The state capital Dispur is situated in the district. The
district headquarter Guwahati is the doorstep to the North Eastern states of
India.

The district headquarters of Kamrup and Kamrup (Metro) are located
at Amingaon and in the heart of the city of Guwahati respectively. This pair of
districts occupy a total population of 27,77,621 as per 2011 census.

Table 3.1: Demographic Profile as per Provisional Population Estimate
2001 and 2011 of Kamrup (undivided) district

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Literacy Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>2001</td>
<td>25,15,030</td>
<td>13,27,717</td>
<td>11,87,313</td>
<td>74.69</td>
</tr>
<tr>
<td>2011</td>
<td>27,77,621</td>
<td>14,35,238</td>
<td>13,42,383</td>
<td>84.74</td>
</tr>
</tbody>
</table>

Source: Department of population and census, Govt. of India.
About 90% of total population lies in rural areas and are mainly engaged in traditional agriculture, allied, non-farm and service related activities. The metropolitan district population is somewhere around a million.

3.5 SELECTION OF SAMPLE

In research, populations of the study have a special significance, because research process can not be systematically led towards the findings without the identification of population. According to Kulbir Singh Sidhu, population means aggregate or totality of objects or individuals regarding which inferences are to be made in a sampling study. Therefore, for any research study the investigator is to specify the population in order to proceed towards logical conclusion with the selection of the representative sample. If the population of a particular problem is not well defined and specified, it becomes difficult to adopt proper sampling procedure and arrive at a representative sample. Sampling is the process by which a relatively small number of individuals or measures of individuals, objects or events is selected and analysed in order to find out something about the entire population from which it was selected. Sampling procedure provides generalizations on the basis of a relatively small proportion of the population. The representative proportion of the population is called sampling. A population refers to any collection of specified group of human beings or non-human entities such as objects, educational institutions, time, units, geographical areas, prices of objects etc.
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In the present study, adolescent boys and girls of undivided Kamrup district are the universe of the investigation. But as the number is too large, the investigator has selected at random only 600 from the universe, who is studying in H. S. 1st and 2nd year classes of different Higher Secondary Schools, Junior colleges and colleges of the metropolitan district of Kamrup and Kamrup. Then the sample population is divided into smaller groups or strata such as sex (Boys and Girls) and residence (Rural and Urban). Therefore for selection of sample in this investigation, the researcher applied multistage stratified random sampling technique. Out of 600 samples 300 numbers from urban (Kamrup metro) and 300 numbers form rural (Kamrup). Again this rural and urban population is divided into 150 boys and 150 girls. Details of sample break up for the study is represented diagrammatically in Fig. 3.1.

Fig 3.1: Diagrammatical representation of sample
## Table 3.2 Sources of Sample and their Breakup

<table>
<thead>
<tr>
<th>Area</th>
<th>Name of Institute</th>
<th>Nos of Students</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kamrup</td>
<td>Rangia College, Rangia</td>
<td>07</td>
<td>14</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Symbiosis Academy, Rangia</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Pragmatic Academy, Rangia</td>
<td>10</td>
<td>09</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Pub Kamrup College, Baihata Charali</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Kaniha Higher Secondary School, Kaniha</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Jawaharjyoti Higher Secondary School, Puthimari</td>
<td>08</td>
<td>08</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Puthimari Higher Secondary School, Soneswar</td>
<td>12</td>
<td>07</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Dakshin Kamrup College, Mirza</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Rampur H.S. School, Rampur</td>
<td>08</td>
<td>14</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Udayan Shanti Niketan, Bezera</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Suren Das College, Hajo</td>
<td>15</td>
<td>07</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Damdoma College, Damdoma(Hajo)</td>
<td>05</td>
<td>08</td>
</tr>
<tr>
<td>Kamrup</td>
<td>Dadara Higher Secondary School, Dadara</td>
<td>06</td>
<td>06</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Handique Girls College, Guwahati</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>B. Barooah College, B.Barooah Road</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Maharshi Vidyamandir Senior Secondary School, Silpukhuri</td>
<td>02</td>
<td>04</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Arya Vidyapeeth College, Gopinath Nagar</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Arya Vidyapeeth Higher Secondary School, Gopinath Nagar</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Dispur Higher Secondary School, Dispur</td>
<td>32</td>
<td>19</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Arya Bhatta Junior Science College, G. S. Road</td>
<td>28</td>
<td>19</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Kendriya Vidyalaya(IOC) Noonmati</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Narengi Anchalic College</td>
<td>06</td>
<td>10</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Dimoria College, Dimoria</td>
<td>05</td>
<td>06</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Assam Valley Junior College, Adabari</td>
<td>08</td>
<td>15</td>
</tr>
<tr>
<td>Kamrup Metro</td>
<td>Pandu College, Pandu</td>
<td>06</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>
3.6 LIMITATION OF THE STUDY

As Assam consists of 27 nos. of districts including 3,11,69,272 (2011 census) population so it is difficult to include the entire district in a single study. Considering the feasibility of the study, the investigator felt to carry out the study among the adolescent boys and girls of Kamrup district. However, the sample strength will be confined to boys and girls of XI\textsuperscript{th} and XII\textsuperscript{th} standard of Higher Secondary School, Junior Colleges and Colleges only.

3.7 DATA COLLECTION

Data collection is an important part of research where the research method describes the over all approaches to the problem. The step is concerned with the procedure and techniques to be adopted for data collection.

3.7.1 Data Collection through Field Work

Good research work depends upon skillfully conducted field work on the part of the researcher. Field work helps the researcher to gather the data relevant to the study, provide bundle of experiences and of course a zeal and thought for new study, based on the new experiences. Any investigation needs exhaustively done field work. Fulfilling this demand, here also, the investigator followed the procedure, described below—

The present study is based on the field study and data collected from the students of two classes (XI and XII/ H.S. 1\textsuperscript{st} and H.S. 2\textsuperscript{nd} year) of different Colleges, Junior Colleges and Higher Secondary Schools. The data was
collected from the greater Kamrup district. The investigator made her best effort to collect most reliable and valid data. By following the stratified random sampling procedure, the investigator selected the sample students of different Colleges, Junior Colleges and Higher Secondary Schools of the metropolitan district of Kamrup and Kamrup district. The researcher started the data collection process from the beginning of the academic year 2007 for pilot study. At the time of seminar paper presentation for final registration, all the required tools were finalized and made ready for data collection. For this purpose, after selecting the sample schools, junior colleges and colleges, the investigator went to the respective institutions one by one and met the principal or head of the institutions and took necessary permission for conducting the field work in the institutions for data collection. Altogether 25 numbers of institutions were selected for the study. The investigator started with the Arya Bhatta Junior Science College, Guwahati. The Principal of the college made an arrangement for all the selected students of two classes in a hall. The investigator talked to the students and explained the purpose of the meeting. Then the investigator interviewed the sample students for required data and information. The investigator also provided the questionnaire and value measurement scale to the students to be filled by them. Since the filling up of questionnaire as well as the value measurement scale is a time consuming process and due to the respondent’s practical classes the researcher could not collect duly filled questionnaire and value measurement scale on that day. After two or three days the investigator went to the college and collected the tools. Following the same procedure the investigator visited
all the institutions and managed to collect the entire questionnaire from the students. The whole process of data collection was very hard and time consuming. The Principal/ Head of the institutions were very co operative in this regard.

3.7.2 Method for Developing the Tools for Data Collection

In every research investigation, a researcher has to collect required data to test the research hypotheses. Therefore, there is a need of selecting and applying proper tools according to the objectives of the study. In the present study, the investigator employed interview schedule, questionnaire, observation, informal talks, and value oriented scale (as prepared by M. Ojha and R. K. Ojha) as tools to elicit data from respondents.

The interview schedule, observation, investigator’s diary has been used to collect the primary data. On the other hand secondary sources consisted of published doctoral thesis, periodicals, books, journals, official records, reports, monograph relating to the problem and life long tool like dictionary etc.

3.7.2.1 Questionnaire

Questionnaire is a popular means of collecting all kinds of data in research. It is a device consisting of a series of questions dealing with some psychological, social, educational etc by using a form which the respondents fill by themselves. A questionnaire is either administered personally to a group of individuals or it is mailed to them to save a great deal of time, money and effort in travel. In the present study, the questionnaire was
administered by the researcher herself which had helped to establish rapport with the respondents, to explain the purpose of the study to the respondents and to explain the meaning of questions to the respondents that may not clear to them. The questionnaire can be classified in terms of the nature of the questions which are used. Questions may be asked in a closed or an open form. The researcher may use any one type of exclusively or both in combination. The investigator had prepared the questionnaire by following both the types in consultation with the respective supervisor to collect information from the adolescents on some important aspects related to the subject.

3.7.2.2 Interview

Before conducting a survey it is essential to employ proper tool. The interview schedule is an ideal tool for collecting data in survey research. Interview is a process of communication or interaction in which the subject gives needed information verbally in a face to face situation. The study demands opinion, interpretation, and illustration of certain points of discussion. Therefore, the researcher involves herself in personal contact with teachers, parents and students through interview to collect information.

The Interview technique is found indispensable in diagnosing the problems. It is largely dependent for its success on the personal ability of the interviewer, which involves certain intimate types of enquiries like questions on personal life etc. It is realized that only a good interviewer who is able to establish sympathetic and friendly relationship with the subjects can get responses. The initial task of securing the confidence and cooperation of the
subject is crucial. Being an interviewer it is required to assure the subject that their responses will be kept in strict confidence and will be used for no purpose other than research.

Interview was conducted in such a manner that the respondents did not find any problem in responding the questions and they were given scope for giving free and frank responses. Every effort was made to allow the free expression of the respondents so that validity and reliability of it could be maintained. For recording responses, a tap recorder was also used, as it is the best device to retain the actual working tone of voice and emotional display.

3.7.2.3 Observation

Observation is a process where the investigator observes the various situations, problems and conditions. It is a more natural way of gathering useful data and may be used in the laboratory as well as in the naturalistic settings. It has been recognised as the most direct means of studying overt behavior of the people. It is used to evaluate the overt behavior of individuals in controlled and uncontrolled situations. Data collected through observation method is found to be more realistic and true than data collected by any other methods. The purpose of observation is to describe the behavioural patterns in varied settings. It provides information related to different types of social behaviour.

The recording of observational data is made soon after the observation. The observer goes on recording her observational data simultaneously with the occurrence of the phenomena observed. Observation is done directly when the observer plays passive role and observed without intervening in
any way. In interview, the observer plays a more active role, by asking a series of questions.

In the present study the investigator applied the observation technique in studying the various situations of adolescents' specific behaviour, attitude, way of talking, their dress sense, hair styles, language used by them etc. Interpretation is made directly by the investigator at the same time of her observation.

3.7.2.4 Measurement of value orientation affected by movies (MVOM) and measurement of value orientation by print media

MVOM is a standardised scale of measurement of value orientation affected by movies which was constructed by Mahalaxmi Ojha and Dr. Raj Kumar Ojha, which is generally used to measure the values affected by movies. In the present study MVOM was applied to measure the value orientation affected by electronic media. By following the same procedure of MVOM the investigator constructed the scale as measurement of values affected by print media. Here, the test was based on six different values such as- social, aesthetic, religious, economic, political and theoretical. These values are the base of human conduct and related to the aim of human life. Further, the test was divided into two parts; in the first part there were 24 questions and 2 alternative answers for each question; which expressed different values. In the later part there were 10 questions having 4 options and each option express any one value. Accordingly, there were 48 options in the first parts and 40 in the second part of the test and all together 88 options which measured the 6 values of the respondents.
3.7.3 Secondary Information

Though the study was based mainly on primary data, secondary sources were also used to verify information collected and enrich the knowledge acquired from primary sources. The researcher visited various libraries, and institutions to study different books, magazines, journals, periodicals, bulletin, and pamphlets, reports etc.

The libraries visited for the study as mentioned below.

i) K.K. Handique library, Gauhati University

ii) Central Library, Calcutta University

iii) Library of Omeo Kumer Das Institute of Social Science and Research

iv) Central Library, North Eastern Hill University (NEHU), Shillong

v) NCERT library, Shillong

vi) SCERT Library, Guwahati

vii) S.K. Bhuyan Library, Cotton College, Guwahati

viii) Arya Vidyapeeth College Library, Guwahati

Besides, the investigator also collected some information related to the study from different offices of Assam. Such as

a) Board of Secondary Education, Guwahati, Assam.

b) Directorate of Census Operation, Govt. of Assam.

c) Door Darshan Kendra, Guwahati, Assam.

3.8 ANALYSIS OF DATA

After collection of data, statistical analysis of data is to be done by the
investigator. Statistical methods are extensively used in educational research. They provide an indispensable tool for collecting, organizing, analyzing and interpreting data expressed in numerical terms.

Statistical analysis of data means studying the tabulated material in order to determine inherent facts. It involves breaking down existing complex factors into simple parts and putting the parts to get in view arrangements for the purpose of interpretation. For the quantitative analysis of the present study various statistical technique are used. These techniques are found to be reliable in analysing the data. In the present study following statistical methods are used.

3.8.1 Table

A table is a systematic method of presenting statistical data in vertical column and horizontal rows, according to some classification of subject matter. Table may convey information more effectively than many paragraphs of written description. It may help the readers to spot important details, see relations, get a concise overview of the findings, or grasp the significance of data much more quickly and easily than through many pages of prose explanation. After the classification of the observed data frequencies are computed in a distribution table.

3.8.2 Calculation of Percentage

Frequencies are always unequal in size. To make comparison with each attribute frequencies are converted into percentage. The percentage of a given
number indicates the number out of one hundred. It is helpful and easier measure for making comparison.

3.8.3 Mean

The arithmetic mean or average is the best known and mostly used method of measuring central tendency. It may be simply defined as the sum total of the separate scores in a series divided by the total number. So this measure is popularly known as the "Average". This mean is highly used in research work. The mean is represented by symbol M.

The formula for calculating the mean of an ungrouped data is

\[ M = \frac{\sum X}{N} \]

Where,

- \( M \) represents the mean
- \( \Sigma \) represents the sum of
- \( X \) represents the scores of others
- \( N \) represents the number of measures

3.8.4 Co-efficient of Correlation

The co-efficient of correlation method is a statistical concept which merely indicates the degree of relationship between two sets of paired phenomena. In the present study, the researcher tried to observe the relationship between the influence of print media and electronic media on psycho-social behaviour of adolescents. Thus to study this relationship, correlation co-efficient was obtained by Product Moment Method, which
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employed the following formula.

$$r = \frac{N \sum x'y' - \sum x' \sum y'}{\sqrt{N \sum x'^2 - (\sum x)^2} \cdot \sqrt{N \sum y'^2 - (\sum y)^2}}$$

Where

$x'$ and $y'$ are deviations from assumed means. It is more accurate than the R of Rank Difference Method ($R_h$).

3.8.5 Test of Significance

The statistical procedure for deciding whether the difference under study is significant or non-significant is called the Test of Significance. There are various methods for testing of significance within a study, which depends on type and design of the study.

In this study, test of significance was computed following Analysis of Varience and Chi ($\chi^2$) Square method.

3.8.5.1 Analysis of variance

When we note observations from a study pertaining to measurement of any other character, we find that the observations vary from one another greatly. This variation is due to number of factors known as Sources of Variation and the portion of variation caused by different sources are known as Component of Variation. The statistical analysis aims at assessing the total variation present and then apportioning it between the various factors responsible for the same. The analysis of variance is a simple arithmetical process of sorting out the components of variation in a given data. In the words of fisher, "It is a tool by which the total variation may be split up into
several physically assignable components. The analysis of variance also provides the test of significance.

3.8.5.1.2 Steps involved in calculation of analysis of variance

Total sum of squares \( = \sum X^2 - \text{CF} \) (where \( \text{CF} = \frac{(\sum X)^2}{N} \))

Sum of square column (SSC) \( = \frac{\sum C^2}{R} - \text{CF} \) (where, \( C \) indicated column and \( R \) indicated row)

Sum of square rows (SSR) \( = \frac{\sum R^2}{C} - \text{CF} \) (where, \( R \) indicated row and \( C \) indicated column)

Interaction sum of squares (SSI) \( = \text{Total SS} - (\text{SSC} + \text{SSR}) \)

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Degrees of freedom</th>
<th>Sum of squares</th>
<th>Mean Sum of squares</th>
<th>F ratio (calculated)</th>
<th>F ratio (tabulated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between column</td>
<td>( C-1 )</td>
<td>CSS</td>
<td>( \frac{\text{SSC}}{\text{DF}} = \text{MSC} )</td>
<td>( \frac{\text{MSC}}{\text{MSI}} )</td>
<td>At 5% and 1% level of significance</td>
</tr>
<tr>
<td>Between rows</td>
<td>( R-1 )</td>
<td>RSS</td>
<td>( \frac{\text{SSR}}{\text{DF}} = \text{MSR} )</td>
<td>( \frac{\text{MSR}}{\text{MSI}} )</td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
<td>( (C-1)(R-1) )</td>
<td>ISS</td>
<td>( \frac{\text{SSI}}{\text{DF}} = \text{MSI} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>( (C \times R)-1 )</td>
<td>Total SS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the present study, the analysis of variance is used to test the significance of different variables (components / indicators) attributing towards the impact on psychosocial behaviour of adolescents, which ultimately fulfill objectives of the study.

3.8.5.2 Chi-square (\( \chi^2 \)) test

Chi-square (\( \chi^2 \)) test is an important technique for computing the
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significance of difference. As a test of 'goodness of fit,' Karl Pearson tried to make use of the $\chi^2$ distribution for devising a test for determining how well the experimentally obtained results fit in the results expected theoretically on some hypothesis regarding the normal shape of distribution. The formula for computing $\chi^2$ as,

$$\chi^2 = \sum \left[ \frac{(f_o - f_e)^2}{f_e} \right]$$

Where,

- $f_o =$ obtained or observed frequency on some experiment
- $f_e =$ expected frequency on hypothesis

### 3.8.6 Graphical representation

Graph is the statistical device of the study of the complex psycho-social problem. The graphic representation of data proves quite an effective and an economic device for the presentation, understanding and interpretation of the collected statistical data. The most widely used graphical devices are the line graph, the bar graph and the pie diagram. In the present study following graphs are used.

#### 3.8.6.1 Bar-diagram

Bar-diagram, also known as column diagram, is another method of graphic representation. It represents the data by bars of equal width, draw to scale length. In bar diagram the bars are usually separated by space. Horizontal bar graphs are usually used to compare components at a particular time. In the present study, the investigator uses Bar diagram to
show the comparison of different attributes of the respondents.

3.8.6.2 Pie-diagram

Pie diagram is also known as circle diagram. Pie diagram is drawn in order to study the given scores in terms of ratio and percentage. This device of presentation of the data appears to be more qualitative and meaningful owing to transformation of the scores in to percentages. As the data are presented in terms of percent within the circle, it naturally gives a meaningful presentation through diagram to the observer. Qualitative difference of the presented data in the form of area of the circle and their corresponding percentages may be observed in a more pictured way here.

3.8.6.3 Use of maps

When geographical location or identification is important, map may be used. Identification may be made by using dots, circles or other symbols and density or characteristics of areas represented by shading. In the present study, the investigator has used maps viz. the map of Assam and the map of Kamrup and Kamrup metro. The maps used are presented in Plate 3.3, Plate 3.4 and Plate 3.5.
Plate 3.1: Plate showing Map of Assam
Plate 3.2: Plate showing Map of Kamrup
Plate 3.3: Plate showing Map of Kamrup (Metro)