CHAPTER – III

RESEARCH METHODOLOGY

3.01 INTRODUCTION

Methodology is a necessary aspect in any investigative work. Every research study has its own objectives. The procedure adopted by the research works for the realization of these objectives is known as methodology. “Methodology is the science of methods or principles of procedure” (Good, 1945, p. 259). The line of attack adopted enables the investigator to look at the amorphous data in an important way.

The present investigation has been undertaken with a view to conduct a comparative study titled “A study on the Classroom Climate and Achievement of Chemistry in relation to certain selected Psychological Variables” with respect to their parental encouragement and socio-economic status in Perambalur and Salem District. The tool, the sample and the statistical techniques used in this study are detailed in the succeeding paragraphs.

3.02 STATEMENT OF THE PROBLEM

The above discussion has made the present investigator to choose the problem at hand and it is stated as follows: “A study on the Classroom Climate and Achievement of Chemistry in relation to certain selected Psychological Variables.”
3.03 OBJECTIVES OF THE STUDY

The following are the objectives of the present study:

1. To find out the level of achievement of higher secondary students in chemistry.

2. To find out the level of classroom climate of higher secondary students.

3. To find out the level of parental encouragement of higher secondary students.

4. To find out the level of socio-economic status of higher secondary students.

5. To find out whether there is no significant difference in achievement level of the higher secondary students in chemistry belonging to different sub samples

a) Gender : Male/Female
b) Type of school : Government / Private
c) Location : Rural / Urban
d) Type of family : Nuclear family / Joint family
e) Community : SC/MBC/BC/OC
f) Birth order : First/Second/Third
g) Parental Education : Illiterate / School Education/College Education
h) Parental occupation : Government/ private/ others
i) Parental income : Below 10,000/10,001-30,000/above 30,000
6. To find out whether there is no significant difference in the classroom climate of higher secondary students belonging to different sub samples

   a) Gender : Male/Female
   b) Type of school : Government / Private
   c) Location : Rural / Urban
   d) Type of family : Nuclear family / Joint family
   e) Community : SC/MBC/BC/OC
   f) Birth order : First/Second/Third
   g) Parental Education : Illiterate / School Education/College Education
   h) Parental occupation : Government/ private/ others
   i) Parental income : Below 10,000/10,001-30,000/above 30,000

7. To find out whether there is no significant difference in the parental encouragement of higher secondary students belonging to different sub samples

   a) Gender : Male/Female
   b) Type of school : Government / Private
   c) Location : Rural / Urban
   d) Type of family : Nuclear family / Joint family
   e) Community : SC/MBC/BC/OC
   f) Birth order : First/Second/Third
   g) Parental Education : Illiterate / School Education/College Education
   h) Parental occupation : Government/ private/ others
   i) Parental income : Below 10,000/10,001-30,000/above 30,000
8. To find out whether there is no significant difference in the socio-economic status of higher secondary students belonging to different sub samples

   a) Gender : Male/Female  
   b) Type of school : Government / Private  
   c) Location : Rural / Urban  
   d) Type of family : Nuclear family / Joint family  
   e) Community : SC/MBC/BC/OC  
   f) Birth order : First/Second/Third  
   g) Parental Education : Illiterate / School Education/College Education  
   h) Parental occupation : Government/ private/ others  
   i) Parental income : Below 10,000/ 10,001-30,000/above 30,000

9. To find out if there is no significant relationship between the achievement of higher secondary students in chemistry and their classroom climate.

10. To find out if there is no significant relationship between the achievement of higher secondary students in chemistry and their Parental encouragement.

11. To find out if there is no significant relationship between the achievement of higher secondary students in chemistry and their socio-economic status.
3.04 HYPOTHESES OF THE STUDY

On the basis of the objectives, the following hypotheses have been formulated.

1. The level of achievement of higher secondary students in chemistry is high.

2. The level of classroom climate of higher secondary students is high.

3. The level of parental encouragement of higher secondary students is high.

4. The level of socio-economic status of higher secondary students is upper class.

5. There is no significant difference in achievement of higher secondary students in chemistry belonging to different sub samples:

   a) Gender : Male/Female
   b) Type of school : Government / Private
   c) Location : Rural / Urban
   d) Type of family : Nuclear family / Joint family
   e) Community : SC/MBC/BC/OC
   f) Birth order : First/Second/Third
   g) Parental Education : Illiterate / School Education/College Education
   h) Parental occupation : Government/ private/ others
   i) Parental income : Below 10,000/ 10,001-30,000/above 30,000
6. There is no significant difference in classroom climate of higher secondary students belonging to different sub samples:

a) Gender : Male/Female
b) Type of school : Government / Private
c) Location : Rural / Urban
d) Type of family : Nuclear family / Joint family
e) Community : SC/MBC/BC/OC
f) Birth order : First/Second/Third
g) Parental Education : Illiterate / School Education/College Education
h) Parental occupation : Government/ private/ others
i) Parental income : Below 10,000/10,001-30,000/above 30,000

7. There is no significant difference in parental encouragement of higher secondary students belonging to different sub samples:

a) Gender : Male/Female
b) Type of school : Government / Private
c) Location : Rural / Urban
d) Type of family : Nuclear family / Joint family
e) Community : SC/MBC/BC/OC
f) Birth order : First/Second/Third
g) Parental Education : Illiterate / School Education/College Education
h) Parental occupation : Government/ private/ others
i) Parental income : Below 10,000/10,001-30,000/above 30,000

8. There is no significant difference in socio-economic status of higher secondary students belonging to different sub samples:
a) Gender : Male/Female  

b) Type of school : Government / Private  

c) Location : Rural / Urban  

d) Type of family : Nuclear family / Joint family  

e) Community : SC/MBC/BC/OC  

f) Birth order : First/Second/Third  

g) Parental Education : Illiterate / School Education/College Education  

h) Parental occupation : Government/ private/ others  

i) Parental income : Below 10,000/10,001-30,000/above 30,000  

9. There is no significant relationship between achievement of higher secondary students in chemistry and their classroom climate.  

10. There is no significant relationship between achievement of higher secondary students in chemistry and their Parental encouragement.  

11. There is no significant relationship between achievement of higher secondary students in chemistry and their socio-economic status. 

**3.05 METHOD OF THE STUDY** 

In order to realize the objectives stated for the purpose Normative Survey method was adopted. Normative Survey method describes and interprets what exists at present. These are concerned with the existing conditions or relations, prevailing practices, beliefs and attitudes, etc. Such investigations are termed in research literature as Descriptive Survey or Normative survey.
3.06 VARIABLE OF THE STUDY

For the present investigation the investigator selected the following variables: Achievement in chemistry, Class Room Climate, Parental Encouragement and socio - Economic Status. The personal data sheet is designed by the investigator to find the demographical variables in the present study. It is used to collect the details regarding the pupils, which includes the following variables.

Dependent variable

Achievement in Chemistry

Independent variables

The independent variables selected for the study are:

- Class Room Climate
- Parental Encouragement and
- Socio-Economic Status

Demographic and organizational variables

a) Gender : Male/Female
b) Type of school : Government / Private
c) Location : Rural / Urban
d) Type of family : Nuclear family / Joint family
e) Community : SC/MBC/BC/OC
f) Birth order : First/Second/Third
g) Parental Education : Illiterate / School Education/College Education
h) Parental occupation : Government/ private/ others
i) Parental income : Below 10,000/10,001-30,000/above 30,000
3.07 OPERATIONAL DEFINITIONS OF THE VARIABLES

3.07.1 Achievement in Chemistry

Achievement signifies accomplishment or gain or a performance carried out successfully by an individual or group or the completion of a task whether it is academic, personal or social. Thus, achievement means all those behavioural changes, which take place in the individual as a result of learning experience of various kinds.

3.07.2 Higher secondary students

Students studying two years bridge course after the 10th standard and before a degree course in Tamil Nadu. Here, higher secondary students refer students studying the Twelfth standard under the higher secondary system.

3.07.3 Classroom climate

Learning situation is the one where formal learning is to be achieved with certain structured learning processes in a structured situation is called classroom. The class room is not just a group of pupil but a specified place, where the pupil are exposed to our society’s ways and values. Classroom is a pervasive phenomenon. Learning in classroom is not independent but the influence of the class. This emphasizes the importance of classroom climate.

3.07.4 Parental encouragement

The father and mother of the child are called the parents. For the betterment of their children, the parents will encourage them in a right way.
3.07.5 Socio-economic Status

“Socio-economic status is a level of indicative of both the social and the economical achievement of an individual or group.” High socio-economic status group had lesser number of adjustment problem than middle and low socio-economic status group. Socioeconomic status depends on a combination of variables, including occupation, education, income, wealth, and place of residence. Sociologists often use socioeconomic status as a means of predicting behavior.

Socioeconomic status, sometimes shortened to SES, is a sociological classification indicating the close relationship between someone’s relative wealth and that person’s social status. Socioeconomic status is one of the key indicators when looking at a number of different community issues, including school performance, crime and housing. It is most often determined by analyzing family income and assets.

3.08 TOOLS USED FOR THE STUDY

The following tools like (i) Achievement in chemistry test (validated by the investigator) (ii) Rajkumar' (1984) class room climate scale. (iii) Parental Encouragement scale developed by Kusum Agarwal (1983) and (iv) Socio-economic Status scale constructed and standardized by Ghosh and Mercy (1978) are having the psychometric properties like achievement in chemistry, classroom climate, parental encouragement and socio economic status included and hence they were used in the present study.
Reliability of Tools

Reliability is the proportion of true variance in a tool (Garett, 1979). In the present study, the typical test- retest method was employed to evaluate the stability of the measurement. The tools were administered by the Investigator on a group of 50 learners and the scores were computed. The same tools were once again administered on the same group after a gap of two months, from the day of the first test administration. The first and the second test scores were correlated by applying the -product moment - correlation technique. They are given in the table below.

### Reliability of Tools Established by the Investigator

<table>
<thead>
<tr>
<th>S. No</th>
<th>Tools</th>
<th>‘r’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Classroom Climate</td>
<td>0.764</td>
</tr>
<tr>
<td>2.</td>
<td>Parental Encouragement</td>
<td>0.803</td>
</tr>
<tr>
<td>3.</td>
<td>Socio-economic status</td>
<td>0.816</td>
</tr>
</tbody>
</table>

Significant at 0.01 level

All the correlation coefficients computed were found to be significant at 0.01 level. Hence, it is concluded that the tools used are highly reliable.

Validity of the Tools
The validity of a tool depends upon the fidelity with which it measures what it purposes to measure (Garett, 1979). In the present study, the face validity, content validity and intrinsic validity measures were established.

(A) Face Validity

Face validity indicates how for the tools look valid, besides it is a judgment validity that has utilitarian value in guiding the research process. In the present study, the developed tools aimed at measuring what the investigator thought in mind. It was thought that the items in the tools measured the concerned variables. Therefore, it is concluded that the tools have sufficient face validity.

(B) Content Validity

Content validity is a systemic examination of the test constructed to find out whether a test covers a representative sample of the behaviour domain to be measured (Anastasi, 1976).

Nunnally (1978) maintains that it is highly meaningful that one should ensure the validity of the tool by the plan and procedure of test construction, rather than establishing the validity of the measures after they are constructed. This can be done through a representative collection of items and a sensible method of test construction. The above guidelines were followed while developing the tool by the respective researchers. Since the investigator used the
standardised tools, the content validity of each tool is established beyond doubt.

(C) Intrinsic validity

Intrinsic validity is, otherwise, called the “index of reliability.” It is indicated in terms of the square root of the reliability coefficient. In the present study, the computed correlation coefficients of the reliability measures are taken in to account. The square root values are given below.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Tools</th>
<th>Intrinsic Validity Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Classroom Climate</td>
<td>0.874</td>
</tr>
<tr>
<td>2.</td>
<td>Parental Encouragement</td>
<td>0.896</td>
</tr>
<tr>
<td>3.</td>
<td>Socio-economic status</td>
<td>0.903</td>
</tr>
</tbody>
</table>

Significant at 0.01 level

It is found that all the computed coefficients are highly valid.

3.8.1 Achievement in chemistry test

The half yearly examination marks scored by the higher secondary students are collected from the school records.
3.8.2 Classroom climate scale Rajkumar’s

The tool was actually developed by Rajkumar’s. Since the tool had already been developed, it needs only revalidation. The investigator has personally visited all the schools and administered the scale himself. The respondent is requested to indicate his/her choice of preference by putting, mark against 'yes/no' choice. The + 1 students of higher secondary students were asked to indicate their choice of preference by putting ‘✓’ mark against 'yes/no' choice. In this scale there are 26 positive statements and 30 negative statements. If the subject put a ‘✓’ a mark of 'yes' for the positive statement 'one' mark is allotted to the particular item. If the subject puts a ‘✓’ mark of 'no' for a positive statement 'zero' is offered to the particular item for the negative statement the reverse order is followed

Theoretical Bases For Construction Of The Scale

Dimensions of the scale

1. Physical climate

The factors and forces that influence passively the phenomena of the classroom is called physical climate. The physical climate is playing a vital role in teaching-and leaning.

Dimensions or sub-groups of Physical Climate

(I) Situation and facility and

(II) Instructional aids
(I) Situation and Facility

Architectural aspects, spatial arrangement, size and density of the classroom, storage issues, ie., action space facilities like ventilation, lighting, type of building, provision of instructional aids, facility for health and hygiene etc. are grouped under situation and facility.

R. P. Singhal in his "A study of teacher pupil Ratio,' says that "the role of a teacher in attracting students to schools and retaining them in classroom as also in providing reasonably satisfactory standard of teaching - learning depends, to a large extent, on the provision and availability of certain essential facilities in schools." Classroom is a cluster of setting. These settings are objective out there behavioural arenas for students and start The setting exhibit physical aspects - site enclosures, facilities manipulanda possess a program or action structure (Joachim F. Wholwill and Harry Helt) In the Classrooms, the physical environment acts as a factor in the learning process and in the children's behaviour (Sommer and Olson, 1980).

(ii) Instructional Aids

Instructional aids reduce verbalism, stimulate self-activity and contribute to the depth and variety of learning - charts, various kinds of boards, models, working models, films, radio, T.V. video and
other demonstrative devices, etc., are instructional aids. Their presence, according to the need of syllabus promotes, the spirit of the classroom and helps the teacher to have confidence on this teaching goals. It increases the self-concept and creativity among both students and teachers in classrooms.

2. Physiological Climate

The factors or the forces the influence actively the total climate inside the classroom and create a physiological climate or functional climate.

Dimensions (Sub-groups) of physiological climate

(iii) Teacher and teaching

(i) Utilization of instructional aids

(ii) Learner and learning

(iii) Teacher – pupil relationship

(iv) Classroom management

(iii) Teacher and Teaching

Influence of teacher’s personality has direct and cumulative impact in the classroom. Teacher has many sided role and acts as a friend, philosopher and guide.

Teacher - teaching approaches,
1. Teacher’s personality traits

2. Teacher’s behaviour and activities

3. Products of teacher’s efforts, etc. are considered

Teachers may be inquisitive about knowing and exploring the conditions under which a classroom phenomenon takes places.

Teaching is more than the aggregate of many acts associated with the classroom. It includes the total influence the teacher exerts on his learners both within and outside the school.

Teacher acts upon many aspects of teaching like, directional, motivational, attitude development, technique, personal, etc.

As Louis Bubin has pointed out, teaching is a complex of 'intangible artistry' which a teaching machine can never possess. Like a live artist, the teacher, with humanistic impulse and personal warmth, can meaningfully motivate pupils.

The conception includes all the activities a teacher does, in the class, to facilitate the learning process. According to Smith, teaching and learning are separately identifiable.

**The effectiveness of teaching is affected by the following:**

Teacher’s competency, mastery of subject matter, physical and health status, personal attributes and emotional control, understanding of human nature and development, knowledge and
appreciation of the learning principles, sensitivity to and appreciation of the differences continued professional and cultural improvement, investigation of teaching success, etc. are considered important since they actively play their role to form the part of the classroom climate.

(iv) **Utilization of instructional aids**

Presence of instructional aids fulfills the physical climate as a component of it. When the aids are utilized according to the necessity of teaching-learning process, they make direct and active influence on the functional climate inside the classroom.

Things taught in a concrete way can be picturised and produced in their own way using skills of applications. To bring things collect into the classroom teaching aids should be used to the medium.

Teaching is rooted in learning and learning is rooted in sensation. So, utilisation of sensory experience by audio visual aids can make better classroom activity and achievement.

Klausmeier and Good win (1975) revealed that lack of student motivation is due to inadequate use of audio visual aids also.

(v) **Learner and Learning**

The learner is the central point in the classroom in teaching-learning process and he himself becomes an interacting factor of the classroom climate. According to Thorndike, learning organism is
natural passive. The behaviour of an organism is caused by the factors outside him. Pavlov theory indicates that learning organism is considered to be the manipulation of external environment.

Learning process also becomes a factor in the classroom climate. Learning is subject centered, and using a set of learning materials following correct methods, can create learning situation. In our system a teacher is held responsible for the learners’ acquisition of knowledge. Learning is a change in behaviour as a result of experience. Learning process leads to learning outcomes which determine the achievement. Learning problems occur frequently at all levels and among different types of students.

(vi) Teacher - pupil relationship

It is a bilateral process which can enhance rapport between the teacher and the pupil. The interaction between a teacher and a student determines the gap between them and there by become an affecting factor of the classroom climate.

Teacher-pupil role expectation and role behaviour are essential. Teacher-pupil perceptions of one another may have considerable impact on teaching - learning process, in the classroom. The following activities may promote reasonably good relationship between the teacher and the students.
Ignoring the misbehaviour, providing the enrichment activities and specialised assistance, reasoning with children, availing assistance and participation of pupils, sense of humour, guidance and counseling, helping to attain realistic goals etc. are to be considered in the classroom.

(vii) Classroom Management

Classroom management becomes an important force in the classroom climate as it creates the situation for teaching learning process inside the classroom.

Discipline and classroom control that favour and promote the learning inside the classroom is classroom management.

Learners are ego - centered and 'self image' of them in a group of learners can lead to mischievous activities in the classroom which may have considerable impact on the classroom climate. Type, time and number of rewards and punishments affect the motivation and learning inside the classroom (Rajeswari workshop). Lippitt and White suggest that the teachers should make use of group dynamics and sociometric techniques in classroom management.

Rewards and punishments, enthusiasm, individualized school work, electing monitors, classified academic works, utilisation of appropriate teaching aids, etc., generally, are suggested for classroom management.
Reliability of the Tool

Reliability is the consistency of the score with which a research tool measures. In describing the consistency of measurement for psychological tests and techniques, three types of reliability co-efficient are generally used. They are:

(i) Co-efficient of internal consistency
(ii) Co-efficient of equivalence
(iii) Co-efficient of stability

In the present study, the co-efficient of reliability of classroom climate scale has been found out by the test-retest method and it was found to be 0.91.

Validity of the Scale

The validity of a measuring instrument depends on the efficiency with which it measures. The classroom climate scale was given to twenty experts and face validity was ensured. There has been 100% agreement among the judges regarding the relevance of items included in the scale.

3.8.3 Parent’s encouragement

Tools used by the Investigator “Agarwal Parent’s encouragement scale” constructed by Dr.Kusum Agarwal are used in this study. The tool consists of eighty items. There are five alternative responses for
each statement, which show the intensity of each statement as Always, Most often, Frequently, Sometimes and Never with the scores of 5,4,3,2 and 1, respectively.

**Agarwal Parental Encouragement Scale**

The bringing up of children is a permanent need of all societies, and the particular way in which it is done is a cultural pattern of that society. Child grows up to fit in his society and the society of child begins with family, which defines the context in which a child receive his early socialization. If parents want to provide optimal facilitative environment conducive to the cognitive development of the children, they should play an important role in the educational process of their children. It is generally believed that the parental care, concern, guidance and influence, or in a word, 'parental encouragement' has an effect on the educational development of the child.

The term 'parental encouragement' is slightly new in psychological research perspective. In parental encouragement, we assume, the parents show it by helping and guiding the child and coaxing him not to feel disheartened at a particular point of difficulty. Rossi (1965) defined this term as, "whenever the mother approve or disapprove of any activity related to education or revoke any hurdle felt by the student in the process, or guide him the right
or wrong – this entire spectrum activity comes within the purview of parental encouragement." So, in short, we can conceptualize parental encouragement in this manner – treatment originating from parents towards the child with a view to enhancing the possibilities of future occurrence of good behaviour by care, concern, approval and guidance.

The present scale is an attempt to measure, qualitatively, the parental encouragement as perceived by the child. It is also a useful tool to categorize the students in term of the degree of their parental encouragement.

**Development of the scale**

After conceptualizing the concept of parental encouragement, the researcher interviewed a large number of parents in order to understand the different types of encouragement given by them to children. In the beginning a questionnaire containing 300 statements was prepared by going through the previous tests and suggestions given by parents. This questionnaire was given to 200 knowledgeable parents and they were asked to eliminate those statements which are either not generally applicable or appear to be a repetition. The questionnaire was given to students who were interviewed by the researcher. At the end, only 100 statements could be approved. These 100 statements were again edited in such
a manner that their meaning is clear and language is simple. After a gap of nearly two months, the final tryout was attempted. These 100 statements were given to 150 parents to respond. Those statements which received less than five per cent of the total response were again eliminated with the assumption that these are not generally application. In this manner, only 80 statements could be retained. These 80 statements constitute the final scale.

**Reliability**

Two indices of reliability of the scale were found out. Firstly, its reliability was determined by K.R. Method (.79), secondly, two test-retest reliabilities were determined after an interval of three months (.82), and the other after an interval of six months (.80). These two sets of reliability coefficients of the scale are presented in the following Table.

**Indices of Reliability of APES**

<table>
<thead>
<tr>
<th>Value</th>
<th>K.R. Method</th>
<th>Test-retest Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=50</td>
<td>.79</td>
<td>Time gap of three months (N=50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time gap of six months (N=50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.80</td>
</tr>
</tbody>
</table>
Validity

For determining the validity of the APES, it was given to 100 parents and 100 students belonging to those parents, respectively. Their separate response where correlated and when the correlation was found high (.73), it was assumed that the scale measures what it desires to measure. In order to establish the internal validity, the responses of each item were correlated with the total responses, which have shown satisfactory correlation (.64).

Scoring

The scale can be scored accurately by hand. The responses of the subjects were assigned numerical values, ranging from 1 to 5, depending upon the degree of perceived parental encouragement, and the following table gives the details of the weightage.

**Scoring the Scale items**

<table>
<thead>
<tr>
<th>Always</th>
<th>Most Often</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

3.8.4 Socio-economic status scale (SESS)

Based on the suggestion given by **Ghosh (1982)**, the investigator studied the socio-economic status of the subjects of the sample with the help of self-devised socio-economic status scale. This scale measures the socio-economic status of the students in terms of their parents' educational, occupational and income levels.
Each of the three components are scored separately following a standardized pattern followed by Mercy (1978); the separate scores for the three components were added up to get the composite socio-economic status score for each subject of the sample.

**Scoring Procedure**

A cumulative score of the three components of the socio-economic status was taken as the measure of socio-economic status. The details of the scoring procedure are (A) Education Score Profession 7, Graduate or post graduate 6, Higher secondary certificate 5, High school certificate 4, Middle school certificate 3, Primary school certificate and 2 Illiterate 1. (B) Occupation Score Profession 10, Semi-profession 6 Clerical, Shop-owner, Farmer 5, Skilled worker 4, Semi-skilled worker 3, Unskilled worker and 2, Unemployed 1, (C) Monthly Income in Rupees Score ≥32050 (12), 16020-32049 (10), 12020-16019 (6), 8010-12019 (4), 4810-8009 (3), 1601 – 4809 (2) and ≤1600 (1). The scoring was done according to the scoring procedure and it is given below: Socio-economic Status Total Score: Upper class 26-29, Middle class 16-25, Lower Middle class 11-15, Upper lower class and 5-10 and Lower class <5.

**Reliability**

Reliability of the scale can be calculated as a measure of external consistency, by the test-retest method, or parallel forms method. However, in the present test, the investigator adopted the test-retest method. The reliability coefficient of the Parental Socio-economic Status Scale is 0.69.
Validity

The first essential quality of valid test is that it should be highly reliable. Besides the content or face validity, the investigator indented to arrive intrinsic validity. Guilford (1950) defined intrinsic validity as the degree to which a test measures what it measures.” The present investigator found out the intrinsic validity of the socio-economic status scale and it is 0.72.

Administration of the Tool

After giving proper instructions to the students, the research tools namely, Attitude towards Teaching Profession Scale, Family Environment Scale, Self-Esteem Scale, Socio-Economic Status scale and personal data sheet were administered. The random sample and 1000 students arise any doubts regarding the question the researcher clarified the same immediately. The completed tools were collected from the students after the stipulated time period.

3.09 SAMPLE OF THE STUDY

Sampling procedure depends upon the research facilities available. It should not be a biased one. The sample was selected by using the simple random sampling technique. The sample includes 800 higher secondary students those who are studying in higher secondary schools in Perambalur and Salem districts only.
## Table 3.1

**List of the Schools**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the Schools</th>
<th>Place</th>
<th>District</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Govt. Boys Higher secondary school</td>
<td>Veeraganur</td>
<td>Salem</td>
</tr>
<tr>
<td>2</td>
<td>Govt. Girls Higher secondary school</td>
<td>Veeraganur</td>
<td>Salem</td>
</tr>
<tr>
<td>3</td>
<td>Govt. Boys Higher secondary school</td>
<td>Kunnam</td>
<td>Perambalur</td>
</tr>
<tr>
<td>4</td>
<td>Govt. Girls Higher secondary school</td>
<td>Kunnam</td>
<td>Perambalur</td>
</tr>
<tr>
<td>5</td>
<td>Sri Ragavendhira Higher secondary school</td>
<td>Veeraganur</td>
<td>Salem</td>
</tr>
<tr>
<td>6</td>
<td>Vanpugal Valluvar Higher secondary school</td>
<td>Kunnam</td>
<td>Perambalur</td>
</tr>
<tr>
<td>7</td>
<td>Dhanalakshmi Srinivasan Higher secondary school</td>
<td>Perambalur</td>
<td>Perambalur</td>
</tr>
<tr>
<td>8</td>
<td>Maruthi Higher secondary school</td>
<td>Deviya Kurichi</td>
<td>Salem</td>
</tr>
<tr>
<td>9</td>
<td>Dominic Higher secondary school</td>
<td>Perambalur</td>
<td>Perambalur</td>
</tr>
<tr>
<td>10</td>
<td>Sankar Higher secondary school</td>
<td>Sankari West</td>
<td>Salem</td>
</tr>
</tbody>
</table>
Figure 3.1

Tamil Nadu Map
Figure 3.2

Salem District Map

Figure 3.3

Perambulur District Map
Variable wise distribution of the sample is given in table 3.2

**Table 3.2**

**Distribution of the Sub-samples**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Groups</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Entire Sample</td>
<td>800</td>
<td>100.00</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>397</td>
<td>49.62</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>403</td>
<td>50.38</td>
</tr>
<tr>
<td>Locality of the School</td>
<td>Rural</td>
<td>438</td>
<td>54.75</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>362</td>
<td>45.25</td>
</tr>
<tr>
<td>Type of management</td>
<td>Private</td>
<td>268</td>
<td>33.50</td>
</tr>
<tr>
<td></td>
<td>Aided</td>
<td>213</td>
<td>26.62</td>
</tr>
<tr>
<td></td>
<td>Government</td>
<td>319</td>
<td>39.88</td>
</tr>
<tr>
<td>Religion</td>
<td>Hindu</td>
<td>525</td>
<td>65.62</td>
</tr>
<tr>
<td></td>
<td>Christian</td>
<td>199</td>
<td>24.88</td>
</tr>
<tr>
<td></td>
<td>Islam</td>
<td>76</td>
<td>9.50</td>
</tr>
<tr>
<td>Type of family</td>
<td>Joint family</td>
<td>275</td>
<td>34.38</td>
</tr>
<tr>
<td></td>
<td>Nuclear family</td>
<td>525</td>
<td>65.62</td>
</tr>
</tbody>
</table>

The variable wise distribution of the sub-samples are represented in the following diagrams (Vide figures 1 to 5)
**Figure 3.4 Distribution of the respondents based on their gender**

![Bar chart showing distribution based on gender]

**Figure 3.5 Distribution of the respondents based on their School Place**

![Polar chart showing distribution based on locality]

- Percentage for Female: 50.38%
- Percentage for Male: 49.62%
- Percentage for Rural: 54.75%
- Percentage for Urban: 45.25%
Figure 3.6 Distribution of the respondents based on their Type of management

Figure 3.7 Distribution of the respondents based on their Religion
3.10 DESCRIPTION OF THE TOOLS

3.10.1 Pilot study of achievement in chemistry

The achievement test in chemistry for Higher secondary students intended for pilot study contains as many as 60 multiple choice for a total of 60 marks copies of this test were given to as many as 60 Higher secondary students studying in Perambalur and Salem districts, Tamil Nadu state India. For all the items (60), after scoring each paper, the correction for chance success was made using the following formula developed by Lindman (1971).

\[ CS = R - \frac{W}{N-1} \]
Where CS - corrected score, Right answer (response)

W – Wrong answer (response), and

N – Number of distracters (alternatives).

The knowledge of Communicable diseases test scores for all the 60 subjects were arranged in the descending order from the top-most scorer to the bottom-most scorers. Then they were subjected to item analysis.

Item analysis is an important step in the validation of any test. The level of the difficulty is indicated by a numerical term the difficulty Index Remarers, (1967). Arbitrarily the difficulty of an item may be given by a panel of experts. But there is a standard and dependable method for it. “The difficulty index of each item is found by averaging the person correct in the upper and lowest groups”. This percentage is approximate but it is accurate enough for most purposes and has the great advantage of easy computation Garrett, (1979). The investigator followed the procedure outlined by Eble, (1966) in computing the indices of item difficulty and discrimination. “Individuals are discriminate when they obtain identical scores Guilford, (1954).

In the present investigation, the upper group has 27 scripts (27%) and the lowest 27 groups to the correct response were added and then divided by the sum of the number of scripts n the upper
and the lower groups. The result decimal fraction was multiplied by 60 in order to express the quotient in percentage.

$$\text{Index of Difficulty} = \frac{RU}{NU} + \frac{RL}{dx} \times 60$$

Where RU – Right Response in the upper group

RL – Lower group

NU- Number of subjects in the Upper group,

NL- Number of subjects in the Lower group.

The measure of item difficulty is an inverse measure. The higher the numerical value of this index of difficulty, the easier the item. In order to find out the index of discrimination for an item, the total number which gave the correct response for that item in the lower group was subtracted from the total number which gave the correct response for that item in the upper group and this difficulty was divided by the number of subjects either in the upper group or in the lower group and the question expressed as a decimal fraction is the index of discrimination.

$$\text{Index of discrimination} = \frac{UR-LR}{NU\text{or}NL}$$

Where UR- corrects responses in the upper group.

NU or NL - No. of subjects in the upper group or lower group
For the purpose of finding the level of achievement in chemistry test among higher secondary students, a test is constructed with 60 items it is then decided to conduct pilot study. In pilot study as many as 60 higher secondary students were involved studying in various higher secondary schools located in urban and rural areas of Perambalur and Salem Districts and they were selected through random sampling method.

3.10.2 Item Analysis and Selection of Items

Difficulty index and discrimination index were calculated for items selection when items are scored simply as 1, if right and 0, if wrong, in choose the best answer type Difficulty index and discrimination index were appropriate Garrett et al. (1979). Difficulty index and discrimination index values for 60 items are give below in table.1. For this total scores of the respondents were arranged in descending order (the highest score was placed on the top and the lowest score was placed on the bottom). Those items whose difficulty index ranged from 40% to 90% and discriminating power falls between 0.30 to 0.76 were selected. Thus 40 items were finally retained for the final study.
### Table 3.3

Indices of Item Difficulty Index and Discriminating Power in Pilot Study

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>CORRECT RESPONSES</th>
<th>H+L</th>
<th>H-L</th>
<th>DIFFICULTY INDEX = (H+L/54)*100</th>
<th>DISCRIMINATIVE INDEX = H-L/27</th>
<th>SELECTED / Not Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Higher level (27%)</td>
<td>Lower level (27%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>14</td>
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<td>10</td>
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<tr>
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<td>22</td>
<td>11</td>
<td>33</td>
<td>11</td>
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<td>0.40740741 Selected</td>
</tr>
<tr>
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<td>6</td>
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<td>12</td>
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<td>0.4444444 Selected</td>
</tr>
<tr>
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<td>8</td>
<td>7</td>
<td>15</td>
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</tr>
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<td>5</td>
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<td>28</td>
<td>12</td>
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<td>0.4444444 Selected</td>
</tr>
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<td>12</td>
<td>33</td>
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<td>DISCRIMINATIVE INDEX = H-L/27</td>
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<td>7</td>
<td>14</td>
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<td>0.51851852</td>
<td>Selected</td>
</tr>
</tbody>
</table>
From the above table, according to Garrett (1979) it is evident that 20 items are not selected and the remaining 40 items are selected. Hence all the above 40 items are retained as such without any change, for the purpose of the final study.

### 3.10.3 Validity

The constructed tool was given to experts in the field of health education and they agreed that the items in the tool were relevant. Hence, it had content validity.

### 3.10.4 Reliability

Its reliability was found to be 0.82 by using a test retest technique followed by use of spearman-brown prophecy formula and its validity was found to be 0.90. Therefore the tool is reliable and valid one.

On the other hand this tool consist 60 items. On the basis of this study 20 questions were rejected and remaining 40 items were selected for final study.

### 3.10.5 Norms of achievement in chemistry test

Norms have been worked out for achievement in chemistry test for higher Secondary students. The percentiles norms in respect of the entire sample were computed for achievement in chemistry test, which is shown the table below:
3.10.6 Percentiles norms for achievement in chemistry test

**Table 3.4**

<table>
<thead>
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<th>PERCENTILES</th>
<th>SCORES</th>
</tr>
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<td>P10</td>
<td>22</td>
</tr>
<tr>
<td>P20</td>
<td>27</td>
</tr>
<tr>
<td>P30</td>
<td>31</td>
</tr>
<tr>
<td>P40</td>
<td>35</td>
</tr>
<tr>
<td>P50</td>
<td>40</td>
</tr>
</tbody>
</table>

3.10.7 Norms of the achievement in chemistry

Norms of the entire sample were computed for the achievement in chemistry, which is shown in table 3.5. Based on the normal probability curves, (Mean ± S.D) low level, average level, high level fixed, which is shown in table 3.5.

**Table 3.5**

<table>
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<th>LEVEL</th>
<th>Scores</th>
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</tr>
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<td>Between 21.22 – 29.62</td>
</tr>
<tr>
<td>High level</td>
<td>Above 29.62</td>
</tr>
</tbody>
</table>
3.11 Statistical Techniques Used

The following are the statistical techniques used in the study

1. Descriptive Analysis
2. Differential Analysis
3. Correlation Analysis and
4. Regression Analysis

3.11.1. Descriptive Analysis

Descriptive analysis involves one of the measures of central tendency the mean and one of the measures of variability standard deviation. These two are useful to determine the central tendency and dispersion of the variables selected for the study. The computed values of the mean and standard deviation are used to describe the properties of a particular, sample and the descriptive statistics are used to reduce the huge data to a manageable size. The means, standard deviations of the entire sample are computed. In order to test the significance the ‘t’ test is used. In order to find out the significance of more than two variables, 'F' test is used in this investigation.

3.11.2. Differential Analysis

Differential analysis involves the most important procedure by which the researcher is able to make inferences involving the determination of the statistical significance of difference between
groups with reference to selected variables. It involves the use of ‘t’ test. The ‘t’ test is a numerical procedure that takes into account the difference between means of two groups, the number of subjects in each group and the amount of variation of spread present in the scores. Thus, the ‘t’ test is a technique for determining whether the performances of two groups differ significantly or not.

3.11.3. Correlation Analysis

The relationship existing between the variables is found by using the correlation method. There are several indicators of relationship and the most frequently used method is by finding the product moment correlation coefficient. The hypotheses are tested at 0.05 and 0.01 levels of significance.

3.11.4 Regression

Regression analysis is used to obtain the quantitative estimate of the effect of each independent variable on higher secondary students’ attitude towards biology while controlling for the effects of all other variables simultaneously.

3.11.5 Level of Significance

The level of significance for rejection or acceptance of the hypothesis has to be decided in advance. In reporting, the findings of the study, the researcher should indicate the actual probability level associated with the findings so that the reader may use his own
judgment in deciding whether the null hypothesis should be rejected or accepted in the present study 0.01, 0.05 level of significance has been taken into account.

3.12 DELIMITATIONS OF THE STUDY

1. The present study is confined only to a random sample of 800 students studying in Perambalur and Salem Districts.

2. Although various factors determine the achievement in Chemistry of higher secondary students, the present study is confined only to a few factors like gender, locality, type of school, father education, mother education, parents’ monthly income, birth order.

3. The research was conducted only in 10 Schools of Perambalur and Salem districts.

1.13 LIMITATIONS OF THE STUDY

Though the research has been properly planned and well executed, there are certain limitations, which are inherent in nature and are beyond the researcher’s control. The effectiveness of the project is felt only when the results are read along with the limitations and constraints faced during the course of this research. The following are the limitations.

1. The responses from the respondents could be casual in nature.

This may be due to lack of interest or time on their part.
2. The correctness of information provided by the respondents in the personal data could not be established.

3. Some of the information provided by the respondents may not be correct.

4. Getting timely responses from the respondents were a difficult task.

5. The reason for this may be attributed to their busy schedules.

6. The study is based only on the higher secondary school students.

3.14 CONCLUSION

In this chapter, the investigator has given the description and the scoring procedure for the tools namely, Class room Climate, Parental Encouragement and Socio-economic Status. The investigator has also given the sampling technique. A detailed description of the number of students in each category and the statistical techniques adopted are also given in this chapter. Thus, all the four tools namely Classroom climate, Parental Encouragement and Socio-economic Status scale were administered to the sample of 800 higher secondary students and the obtained data were statistically treated and interpreted. They are presented in the succeeding chapters.