CHAPTER III

PLAN AND PROCEDURE
CHAPTER III

PLAN AND PROCEDURE

RATIONALE FOR THE STUDY

The success of a science education depends not only on the content of the course, but also on the teaching techniques employed. By doing experiments in the laboratory, the students can get the real knowledge on science. The importance of the practical component in education cannot be ignored. But, in reality educational system continues to ignore the practicals in science. Every state has a board of secondary education, which prepares the theoretical and practical syllabus in science. The advancement of any society depends on the quality of education imparted there. The scope of practicals should not be just academic. But it should be application oriented.

Science is an accumulated and systematized learning, in general uses restricted to natural phenomenan. The progress of science is marked not only by an accumulation of facts, but also by the emergence of scientific method and the scientific-attitude. The principal goal of science education is to, create men who are capable of doing new things, not only of repeating what other generations have done, men who are creative, inventive and discoverers. That is why we teach science.
Teaching of science for everybody has become part of general education. At primary and high school level, the teaching of science should follow the lecture and demonstration method. But the laboratory is not properly utilized at primary and high school level. Only cognitive domain is developed at primary and high school level. But the affective and psychomotor domains are not properly developed at this stage. Under the educational scheme of the State Science Education Board, the laboratory is utilized at plus two level.

At higher secondary stage, the science teacher is to demonstrate some experiments and arrange for individual experiments in the laboratory. So the higher secondary stage, affective and psychomotor domains are developed. For quality science education, individual laboratory technique is to be provided. Only quality science education can produce scientists. The scientists can contribute to national economic development. Keeping in view of the development of nation, this study gets significance.

**STATEMENT OF THE PROBLEM**

The study has been captioned as the 'ANALYSIS OF THE PROCESS OF TEACHING ZOOLOGY AMONG HIGHER SECONDARY SCHOOL STUDENTS'.
DEFINITION OF THE TERMS

ANALYSIS : The separating of any material or abstract entity into its constituent elements (Random House Webster's College Dictionary, 1996, p.49).


TEACHING : The art or profession of a person who teaches (Random House Webster's College Dictionary, 1996, p.1369).

ZOOLOGY : A branch of biology that involves the study of animals (Concise Dictionary of Biology, 1994, p.434).

HIGHER SECONDARY SCHOOL : In Tamil Nadu, 10+2+3 system of education is followed and the secondary schools with classes XI and XII which follow the syllabus prescribed by the Board of Higher Secondary Examination, Madras, are known as higher secondary schools.

GENERAL OBJECTIVES

The general objectives of the present research are the following:

1. To analyse the syllabus in zoology of eleventh and twelfth standard.
2. To analyse the zoology text books of eleventh and twelfth standard.
3. To study the size and availability of facilities in zoology laboratory of the higher secondary schools in Kanyakumari, Tirunelveli and Thoothukudi districts.
4. To study the techniques of teaching zoology in the higher secondary schools in Kanyakumari, Tirunelveli and Thoothukudi districts.

5. To study the organisation of practical classes in zoology for eleventh and twelfth standard in Kanyakumari, Tirunelveli and Thoothukudi districts and

6. To analyse the pattern of question papers in zoology at eleventh and twelfth standard.

SPECIFIC OBJECTIVES

The specific objectives of this investigation were -

1. To study the techniques of teaching zoology in higher secondary schools of Kanyakumari, Tirunelveli and Thoothukudi districts with respect to

   a) Sex : Male / Female
   b) Location of the school : Rural / Urban
   c) Educational Qualification : M.Sc., B.Ed./M.Ed./M.Phil.
   d) Years of teaching experience : Upto 10 years/11-20 years/ Above 21 years
   e) Medium of Instruction : Tamil / English / Both
   f) Types of School : Boys / Girls / Co-education
   g) Types of Management of school : Government School/ Private-Aided school/Private - un Aided school
   h) Strength of the students in Group II zoology : Eleventh standard and Twelfth standard
2) To study the organisation of practical classes in zoology for eleventh and twelfth standard in Kanyakumari, Tirunelveli and Thoothukudi districts with respect to

a) Sex : Male / Female
b) Location of the school : Rural / Urban
c) Educational Qualification : M.Sc., B.Ed./M.Ed./M.Phil.
d) Years of teaching experience : Upto 10 years/11-20 years/
   Above 21 years
e) Medium of Instruction : Tamil / English / Both
f) Types of School : Boys / Girls / Co-education
g) Types of Management of school : Government School/ Private-Aided school/Private - un Aided school
h) Strength of the students in Group II zoology : Eleventh standard and Twelfth standard

HYPOTHESES

The following null hypotheses were formulated for the study.

4.1 There was no significant association between the required size of the laboratory and observed size of the laboratory in Kanyakumari district on

i) Eleventh standard and ii) Twelfth standard
4.2 There was no significant association between the required size of the laboratory and the observed size of the laboratory in Tirunelveli district on
i) Eleventh standard and     ii) Twelfth standard

4.3 There was no significant association between the required size of the laboratory and the observed size of the laboratory in Thoothukudi district on
i) Eleventh standard and     ii) Twelfth standard

4.4 There was no significant association between the required size of the laboratory and the observed size of the laboratory in Government schools on
i) Eleventh standard and     ii) Twelfth standard

4.5 There was no significant association between the required size of the laboratory and the observed size of the laboratory in private aided schools on
i) Eleventh standard and     ii) Twelfth standard

4.6 There was no significant association between the required size of the laboratory and the observed size of the laboratory in private unaided schools on
i) Eleventh standard and     ii) Twelfth standard
4.7 There was no significant association between the availability of equipments and the equipments needed for the providing individual experiments in eleventh standard on
i) Kanyakumari district ii) Tirunelveli district
iii) Thoothukudi district and iv) All districts

4.8 There was no significant association between the availability of equipments and the equipments needed for providing individual experiments in twelfth standard on
i) Kanyakumari district ii) Tirunelveli district
iii) Thoothukudi district and iv) All districts

4.9 There was no significant difference between the mean scores of techniques of teaching zoology with respect to sex of the teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.10. There was no significant difference between the mean scores of techniques of teaching zoology with respect to sex of the teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.11. There was no significant difference between the mean scores of techniques of teaching zoology with respect to sex of the teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard
4.12. There was no significant difference between the mean scores of techniques of teaching zoology with respect to sex of the teachers in all districts on
   i) Eleventh standard and ii) Twelfth standard

4.13. There was no significant difference between the mean scores of techniques of teaching zoology with respect to location of school in Kanyakumari district on
   i) Eleventh standard and ii) Twelfth standard

4.14. There was no significant difference between the mean scores of techniques of teaching zoology with respect to location of school in Tirunelveli district on
   i) Eleventh standard and ii) Twelfth standard

4.15. There was no significant difference between the mean scores of techniques of teaching zoology with respect to location of school in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard

4.16. There was no significant difference between the mean scores of techniques of teaching zoology with respect to location of school in all districts on
   i) Eleventh standard and ii) Twelfth standard
4.17. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational qualification of teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.18. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational qualification of teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.19. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational qualification of teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.20. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational qualification of teachers in all districts on
i) Eleventh standard and ii) Twelfth standard

4.21. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational experience of teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard
4.22. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational experience of teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.23. There was no significant difference among the mean scores of techniques of teaching zoology with respect to educational experience of teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.24. There was no significant difference between the mean scores of techniques of teaching zoology with respect to educational experience of teachers in all districts on
i) Eleventh standard and ii) Twelfth standard

4.25. There was no significant difference among the mean scores of techniques of teaching zoology with respect to medium of instruction of teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.26. There was no significant difference among the mean scores of techniques of teaching zoology with respect to medium of instruction of teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard.
4.27. There was no significant difference among the mean scores of techniques of teaching zoology with respect to medium of instruction of teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.28. There was no significant difference among the mean scores of techniques of teaching zoology with respect to medium of instruction of teachers in all districts on
i) Eleventh standard and ii) Twelfth standard

4.29. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of school in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.30. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of school in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.31. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of school in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard
4.32. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of school in all districts on
   i) Eleventh standard and ii) Twelfth standard

4.33. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of management of school in Kanyakumari district on
   i) Eleventh standard and ii) Twelfth standard

4.34. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of management of school in Tirunelveli district on
   i) Eleventh standard and ii) Twelfth standard

4.35. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of management of school in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard

4.36. There was no significant difference among the mean scores of techniques of teaching zoology with respect to types of management of school in all districts on
   i) Eleventh standard and ii) Twelfth standard
4.37. There was no significant difference among the mean scores of techniques of teaching zoology with respect to strength of the students in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.38. There was no significant difference among the mean scores of techniques of teaching zoology with respect to strength of the students in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.39. There was no significant difference among the mean scores of techniques of teaching zoology with respect to strength of the students in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.40. There was no significant difference among the mean scores of techniques of teaching zoology with respect to strength of the students in all districts on
i) Eleventh standard and ii) Twelfth standard

4.41. There was no significant difference among the mean scores of organization of practical classes with respect to sex of the teachers in Kanyakumari District on
i) Eleventh standard and ii) Twelfth standard
4.42. There was no significant difference among the mean scores of organization of practical classes with respect to sex of the teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.43. There was no significant difference among the mean scores of organization of practical classes with respect to sex of the teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.44. There was no significant difference among the mean scores of organization of practical classes with respect to sex of the teachers in all districts on
i) Eleventh standard and ii) Twelfth standard

4.45. There was no significant difference among the mean scores of organization of practical classes with respect to location of school in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.46. There was no significant difference among the mean scores of organization of practical classes with respect to location of school in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard
4.47. There was no significant difference among the mean scores of organization of practical classes with respect to location of school in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.48. There was no significant difference among the mean scores of organization of practical classes with respect to location of school in all districts on
i) Eleventh standard and ii) Twelfth standard

4.49. There was no significant difference among the mean scores of organization of practical classes with respect to educational qualification of teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.50. There was no significant difference among the mean scores of organization of practical classes with respect to educational qualification of teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.51. There was no significant difference among the mean scores of organization of practical classes with respect to educational qualification of teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard
4.52. There was no significant difference among the mean scores of organization of practical classes with respect to educational qualification of teachers in all districts on
   i) Eleventh standard and ii) Twelfth standard

4.53. There was no significant difference among the mean scores of organization of practical classes with respect to experience of teachers in Kanyakumari district on
   i) Eleventh standard and ii) Twelfth standard

4.54. There was no significant difference among the mean scores of organization of practical classes with respect to experience of teachers in Tirunelveli district on
   i) Eleventh standard and ii) Twelfth standard

4.55. There was no significant difference among the mean scores of organization of practical classes with respect to experience of teachers in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard

4.56. There was no significant difference among the mean scores of organization of practical classes with respect to experience of teachers in all districts on
   i) Eleventh standard and ii) Twelfth standard
4.57. There was no significant difference among the mean scores of organization of practical classes with respect to medium of instruction of teachers in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard

4.58. There was no significant difference among the mean scores of organization of practical classes with respect to medium of instruction of teachers in Tirunelveli district on
i) Eleventh standard and ii) Twelfth standard

4.59. There was no significant difference among the mean scores of organization of practical classes with respect to medium of instruction of teachers in Thoothukudi district on
i) Eleventh standard and ii) Twelfth standard

4.60. There was no significant difference among the mean scores of organization of practical classes with respect to medium of instruction of teachers in all districts on
i) Eleventh standard and ii) Twelfth standard

4.61. There was no significant difference among the mean scores of organization of practical classes with respect to types of school in Kanyakumari district on
i) Eleventh standard and ii) Twelfth standard
4.62. There was no significant difference among the mean scores of organization of practical classes with respect to types of school in Tirunelveli district on
   i) Eleventh standard and ii) Twelfth standard

4.63. There was no significant difference among the mean scores of organization of practical classes with respect to types of school in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard

4.64. There was no significant difference among the mean scores of organization of practical classes with respect to types of school in all districts on
   i) Eleventh standard and ii) Twelfth standard

4.65. There was no significant difference among the mean scores of organization of practical classes with respect to types of management of school in Kanyakumari district on
   i) Eleventh standard and ii) Twelfth standard

4.66. There was no significant difference among the mean scores of organization of practical classes with respect to types of management of school in Tirunelveli district on
   i) Eleventh standard and ii) Twelfth standard
4.67. There was no significant difference among the mean scores of organization of practical classes with respect to types of management of school in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard

4.68. There was no significant difference among the mean scores of organization of practical classes with respect to types of management of school in all districts on
   i) Eleventh standard and ii) Twelfth standard

4.69. There was no significant difference among the mean scores of organization of practical classes with respect to strength of the students in Kanyakumari district on
   i) Eleventh standard and ii) Twelfth standard

4.70. There was no significant difference among the mean scores of organization of practical classes with respect to strength of the students in Tirunelveli district.
   i) Eleventh standard and ii) Twelfth standard

4.71. There was no significant difference among the mean scores of organization of practical classes with respect to strength of the students in Thoothukudi district on
   i) Eleventh standard and ii) Twelfth standard and
There was no significant difference among the mean scores of organization of practical classes with respect to strength of the students in all districts on

i) Eleventh standard and ii) Twelfth standard

CONTENT ANALYSIS

For objective (1) analysis of eleventh and twelfth standard syllabus, Tamil Nadu State Board syllabus for eleventh and twelfth standard (2003-2004) was made use of.

For objective (2) analysis of zoology text book for eleventh and twelfth standard, the text books published by the Tamil Nadu Text book society (2003-2004) were made use of.

For objective (6) analysis of zoology question papers for eleventh and twelfth standard, question papers of the government examinations (1998-2004) were made use of. (Appendix - V).

Content analysis was the technique used for the above stated three objectives.

For objectives (3), (4) and (5) data were collected through the tools developed by the investigator.
PRELIMINARY STUDY

After the selection of the problem, tools to study the
techniques of teaching zoology, availability of facilities in the laboratory
and the organisation of practicals were constructed by the investigator
in consultation with the guide. They were given to 10 experts. Of them
three were government higher secondary school post graduate teachers
in zoology, five were aided higher secondary school post graduate teachers
in zoology and rest were experts in zoology. On their suggestions, items
in the questionnaire were rearranged.

Then the questionnaires were given to twenty higher
secondary school post-graduate teachers in zoology, selected randomly
from Thoothukudi Educational District. They went through the items
and responded all the questions.

PILOT STUDY

After testing the content valedity of the questionnaires, they
were administered on 40 respondents selected from the three revenue
districts under investigation. They all co-operated with the researcher.
The data collected were processed with the help of appropriate statistics.

PROCEDURE OF DATA COLLECTION

The investigator getting an introductory letter from the
head of the institution where he is working, met the chief educational
officers and the respective heads of the higher secondary schools in Kanyakumari, Tirunelveli and Thoothukudi districts. After seeking their permission, the investigator contacted the post-graduate teachers in zoology. He explained the purpose of the study to them. Since the investigator personally visited the schools and administered the tools, there was no incidence of non-returns of questionnaire.

AREA SELECTED FOR STUDY

This study has been conducted in Kanyakumari, Tirunelveli and Thoothukudi districts in Tamilnadu.

Kanyakumari, known as Cape Comorin, is the Land's end of India. The three seas - the Bay of Bengal, the Indian Ocean and the Arabian Sea - meet here, and a dip in their confluence is considered holy. The shore temple in this famous pilgrim centre is dedicated to the virgin Goddess Devi Kanyakumari. This is the only place in India where one can enjoy the unique experience of watching the sunrise and sunset and moonrise simultaneously on full moon day. Swami Vivekananda came down to Kanyakumari in 1892 and sat on the rock for meditation. The memorial was built in 1970. There is a Dhyana Mandapam where one can sit in a serene atmosphere and meditate. The Mahatma Gandhi Memorial is located on the shore area of the Kanyakumari. This memorial to Gandhiji is raised at the spot where his ashes were kept for public darshan before immersion. The architecture of the memorial is such
MAP 2 TAMIL NADU - DISTRICTS

ANDHRA PRADESH

KARNATAKA

TAMIL NADU

BAY OF BENGAL

Kerala

VIRUDHUNAGAR

GULF OF MANNAR

THOOTHUKUDI

TIRUNELVELLI

KANYAKUMARI

INDIAN OCEAN
that the sun's rays fall at the spot where the ashes were kept, on 2nd October.

The Tirunelveli district 4.326 square mile in extent, forms the southern most Collectorate of British India. It is bounded on the east and south by the Gulf of Mannar. On the west is Travancore, the frontier following, with a few important exceptions, the watershed of the Western Ghats. Thoothukudi is the head quarters of Thoothukudi district. Thoothukudi district is bifurcated from Tirunelveli district and came into existence from 20th October 1986. Thoothukudi town is in the Gulf of Mannar, about 125 km north of cape comorin and 720km south of Chennai.

SAMPLE

The study was conducted in Kanyakumari, Tirunelveli and Thoothukudi districts.

In Kanyakumari district, there are 122 higher secondary schools functioning under the State Board Syllabus. Of the above schools, 49 are government higher secondary schools, 61 are management aided higher secondary schools and 12 are management unaided higher secondary schools. Among the 122 higher secondary schools, the investigator has selected 50 higher secondary schools.
In Tirunelveli district, there are 155 higher secondary schools functioning under the State Board syllabus. Of the above schools, 60 are government higher secondary schools, 88 are management aided higher secondary schools and 7 are management unaided higher secondary schools. Among the 155 higher secondary schools, the investigator has selected 53 higher secondary schools.

In Thoothukudi district, there are 109 higher secondary schools functioning under the State Board Syllabus. Of the above schools, 33 are government higher secondary schools, 71 are management aided higher secondary schools and 5 are management unaided higher secondary schools. Among the 109 higher secondary schools, the investigator has selected 47 higher secondary schools.
**TABLE 3.1.**

**DISTRIBUTION OF SAMPLE WITH RESPECT TO SEX**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Kanyakumari</th>
<th>Tirunelveli</th>
<th>Thoothukudi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>14.67</td>
<td>24</td>
<td>16.00</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>18.66</td>
<td>29</td>
<td>19.33</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33.33</td>
<td>53</td>
<td>35.33</td>
</tr>
</tbody>
</table>

Two-fifths of the respondents were male and the rest were female. About one-third of the respondents were from each district.

**TABLE 3.2.**

**DISTRIBUTION OF SAMPLE WITH RESPECT TO LOCATION OF SCHOOL**

<table>
<thead>
<tr>
<th>Location of School</th>
<th>Kanyakumari</th>
<th>Tirunelveli</th>
<th>Thoothukudi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>RURAL</td>
<td>24</td>
<td>16.00</td>
<td>30</td>
<td>20.00</td>
</tr>
<tr>
<td>URBAN</td>
<td>26</td>
<td>17.33</td>
<td>23</td>
<td>15.33</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33.33</td>
<td>53</td>
<td>35.33</td>
</tr>
</tbody>
</table>

The above table pictures the location of the school of the respondents taken for the study. Three-fifths and two-fifths of the respondents were from schools in rural and urban respectively.
FIGURE 3.1.

DISTRIBUTION OF SAMPLE WITH RESPECT TO SEX

Kanyakumari  Tirunelveli  Thoothukudi

Districts

22  28  29  27

Number of Respondents

Male  Female
FIGURE 3.2.

DISTRIBUTION OF SAMPLE WITH RESPECT TO LOCATION OF SCHOOL

Kanyakumari  Tirunelveli  Thoothukudi

Number of Respondents

Districts

Rural  Urban
TABLE 3.3.
DISTRIBUTION OF SAMPLE WITH RESPECT TO EDUCATIONAL QUALIFICATION

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Districts</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kanyakumari</td>
<td>Tirunelveli</td>
<td>Thoothukudi</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>91</td>
<td>47</td>
<td>150</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>M.Sc. BEd</td>
<td>4</td>
<td>13</td>
<td>14</td>
<td>31</td>
<td>20.67%</td>
<td></td>
</tr>
<tr>
<td>MSc. MEd</td>
<td>34</td>
<td>33</td>
<td>24</td>
<td>91</td>
<td>60.67%</td>
<td></td>
</tr>
<tr>
<td>MSc.B.Ed. MPhil</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>12</td>
<td>8.00%</td>
<td></td>
</tr>
<tr>
<td>MSc.M.Ed. MPhil</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>16</td>
<td>10.67%</td>
<td></td>
</tr>
</tbody>
</table>

The above table marks the educational qualification of the respondents of the study. One-fifth of the respondents were M.Sc., B.Ed., third-fifth of the respondent were M.Sc., M.Ed., about one-tenth of the respondents were M.Sc., B.Ed., and M.Phil., and one-tenth of the respondents were M.Sc., M.Ed and M.Phil.
FIGURE 3.3.

DISTRIBUTION OF SAMPLE WITH RESPECT TO EDUCATIONAL QUALIFICATION
TABLE 3.4.

DISTRIBUTION OF SAMPLE WITH RESPECT TO YEARS OF SERVICE

<table>
<thead>
<tr>
<th>Years of Service</th>
<th>Kanyakumari</th>
<th>Tirunelveli</th>
<th>Thoothukudi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10 Years</td>
<td>14</td>
<td>17</td>
<td>13</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>9.33%</td>
<td>11.33%</td>
<td>8.67%</td>
<td>29.33%</td>
</tr>
<tr>
<td>11-20 Years</td>
<td>20</td>
<td>25</td>
<td>23</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>13.33%</td>
<td>16.67%</td>
<td>15.33%</td>
<td>45.33%</td>
</tr>
<tr>
<td>Above 21 Years</td>
<td>16</td>
<td>11</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>10.67%</td>
<td>7.33%</td>
<td>7.34%</td>
<td>25.34%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>53</td>
<td>47</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>33.33%</td>
<td>35.33%</td>
<td>31.34%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

The above table shows the years of service of the respondents. Three-tenths of the respondents had less than 10 years service, about half of the respondents had 11 to 20 years service and one-fourth of the respondents had above 21 years of experiences.
FIGURE 3.4.
DISTRIBUTION OF SAMPLE WITH RESPECT TO YEARS OF SERVICE

Less than 10 years □ 11-20 years □ Above 21 years
### TABLE 3.5.

**DISTRIBUTION OF SAMPLE WITH RESPECT TO MEDIUM OF INSTRUCTION**

<table>
<thead>
<tr>
<th>Medium of Instruction</th>
<th>Districts</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kanyakumari</td>
<td>Tirunelveli</td>
<td>Thoothukudi</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Tamil</td>
<td>23</td>
<td>15.33</td>
<td>42</td>
<td>28.00</td>
<td>32</td>
</tr>
<tr>
<td>English</td>
<td>4</td>
<td>2.67</td>
<td>2</td>
<td>1.33</td>
<td>3</td>
</tr>
<tr>
<td>Both</td>
<td>23</td>
<td>15.33</td>
<td>9</td>
<td>6.00</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33.33</td>
<td>53</td>
<td>35.33</td>
<td>47</td>
</tr>
</tbody>
</table>

The above table lists the medium of instruction of the respondents taken for the study. Three-fifths, about one-tenth and three-tenths of the respondents were in the medium Tamil, English and both respectively.
FIGURE 3.5.

DISTRIBUTION OF SAMPLE WITH RESPECT TO MEDIUM OF INSTRUCTION
TABLE 3.6.

DISTRIBUTION OF SAMPLE WITH RESPECT TO TYPES OF SCHOOL

<table>
<thead>
<tr>
<th>Types of School</th>
<th>Districts</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Kanyakumari</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>7</td>
<td>4.67</td>
<td>8</td>
<td>5.33</td>
<td>5</td>
</tr>
<tr>
<td>Girls</td>
<td>16</td>
<td>10.67</td>
<td>15</td>
<td>10.00</td>
<td>17</td>
</tr>
<tr>
<td>Co-Education</td>
<td>27</td>
<td>18.00</td>
<td>30</td>
<td>20.00</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33.33</td>
<td>53</td>
<td>35.33</td>
<td>47</td>
</tr>
</tbody>
</table>

The sample covers one-tenth of the respondents from boys schools, about one-third of the respondents from girls schools and half of the respondents from co-education schools.
FIGURE 3.6.

DISTRIBUTION OF SAMPLE WITH RESPECT TO TYPES OF SCHOOL

<table>
<thead>
<tr>
<th>Districts</th>
<th>Boys</th>
<th>Girls</th>
<th>Co-Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanyakumari</td>
<td>7</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Tirunelveli</td>
<td>8</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Thoothukudi</td>
<td>5</td>
<td>17</td>
<td>25</td>
</tr>
</tbody>
</table>
### TABLE 3.7.

**DISTRIBUTION OF SAMPLE WITH RESPECT TO TYPES OF MANAGEMENT OF THE SCHOOL**

<table>
<thead>
<tr>
<th>Management of the School</th>
<th>Districts</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kanyakumari</td>
<td>Tirunelveli</td>
<td>Thoothukudi</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>GOVT.</td>
<td>15</td>
<td>10.00</td>
<td>18</td>
<td>12.00</td>
<td>14</td>
<td>9.33</td>
</tr>
<tr>
<td>PRIV(A)</td>
<td>30</td>
<td>20.00</td>
<td>31</td>
<td>20.67</td>
<td>29</td>
<td>19.34</td>
</tr>
<tr>
<td>PRI(UA)</td>
<td>5</td>
<td>3.33</td>
<td>4</td>
<td>2.67</td>
<td>4</td>
<td>2.67</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>33.33</strong></td>
<td><strong>53</strong></td>
<td><strong>35.33</strong></td>
<td><strong>47</strong></td>
<td><strong>31.34</strong></td>
</tr>
</tbody>
</table>

Three-fifths of the respondents were from private aided schools, one-third of the respondents were from Government schools and about one-tenth of the respondents were from private unaided schools.
FIGURE 3.7

DISTRIBUTION OF SAMPLE WITH RESPECT TO TYPES OF MANAGEMENT OF SCHOOL

<table>
<thead>
<tr>
<th>District</th>
<th>Government</th>
<th>Private Aided</th>
<th>Private Unaided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanyakumari</td>
<td>15</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Tirunelveli</td>
<td>18</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Thoothukudi</td>
<td>14</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Number of Respondents
### TABLE 3.8.

**DISTRIBUTION OF SAMPLE WITH RESPECT TO STRENGTH OF THE STUDENTS IN XI STANDARD**

<table>
<thead>
<tr>
<th>No. of Students</th>
<th>Distincts</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kanyakumari</td>
<td>Tirunelveli</td>
<td>Thoothukudi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Less than 20</td>
<td>2</td>
<td>5</td>
<td>14</td>
<td>21</td>
<td>14.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-40</td>
<td>26</td>
<td>36</td>
<td>23</td>
<td>85</td>
<td>56.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 40</td>
<td>22</td>
<td>12</td>
<td>10</td>
<td>44</td>
<td>29.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>53</td>
<td>47</td>
<td>150</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above table shows the number of students studying in the XI standard in Kanyakumari, Tirunelveli & Thoothukudi district. Three-fifths of the schools were having the students between 21-40, about one-tenth of the schools were having the students less than 20 and about one-third of the schools were having the students above 40.
FIGURE 3.8.

DISTRIBUTION OF SAMPLE WITH RESPECT TO
STRENGTH OF STUDENTS IN XI STANDARD

<table>
<thead>
<tr>
<th>Districts</th>
<th>Less than 20</th>
<th>21-40</th>
<th>Above 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanyakumari</td>
<td>2</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Tirunelveli</td>
<td>5</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>Thoothukudi</td>
<td>14</td>
<td>10</td>
<td>23</td>
</tr>
</tbody>
</table>
TABLE 3.9.

DISTRIBUTION OF SAMPLE WITH RESPECT TO STRENGTH OF THE STUDENTS IN XII STANDARD

<table>
<thead>
<tr>
<th>No. of Students</th>
<th>Kanyakumari</th>
<th>Tirunelveli</th>
<th>Thoothukudi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Less than 20</td>
<td>2</td>
<td>1.33</td>
<td>4</td>
<td>2.67</td>
</tr>
<tr>
<td>21-40</td>
<td>26</td>
<td>17.33</td>
<td>38</td>
<td>25.33</td>
</tr>
<tr>
<td>Above 40</td>
<td>22</td>
<td>14.67</td>
<td>11</td>
<td>7.33</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>33.33</td>
<td>53</td>
<td>35.33</td>
</tr>
</tbody>
</table>

Three-fifths, one-third and one-tenth of the schools were having the students 21-40, above 40 and less than 20 respectively.
FIGURE 3.9.

DISTRIBUTION OF SAMPLE WITH RESPECT TO STRENGTH OF STUDENTS IN XII STANDARD

<table>
<thead>
<tr>
<th>District</th>
<th>Less than 20</th>
<th>21-40</th>
<th>Above 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanyakumari</td>
<td>2</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>Tirunelvelli</td>
<td>4</td>
<td>38</td>
<td>11</td>
</tr>
<tr>
<td>Thoothukudi</td>
<td>24</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>
TOOLS

Two data gathering instruments made use of in the present investigation. They were,

1. Questionnaire to measure techniques of teaching and organisation of practicals in zoology at eleventh and twelfth standard.
2. Check list for availability of equipments in zoology at eleventh and twelfth standard.

QUESTIONNAIRE

The first part of the tool was seeking general information about the respondents. They were as follows.

a) Name of the school
b) Sex
c) Location of School
d) Educational Qualification
e) Years of Teaching Experience
f) Medium of Instruction
g) Types of School
h) Types of Management of School
i) Strength of the students in group II zoology

The second part of the tool was measuring techniques of teaching and organisation of practicals in zoology. It was prepared by investigator. It was in the form of six point rating scale viz., 1) lecture, 2) lecture - cum demonstration, 3) Discussion, 4) Individual laboratory
work, 5) group work (laboratory) and 6) Field study. The scores for six point rating scale was 6, 5, 4, 3, 2 and 1. For the appropriate teaching technique for the particular unit, the score was 6 and the inappropriate technique score was 1. In this tool, total number of items in techniques of teaching zoology at +1 level were 27, and +2 level were 32.

The third part was pertaining to organisation of practical classes for eleventh and twelfth standard. In this part, total number of statements were 2. The statement regarding practical classes for all students at the same time has values 3, 2, and 1 and the statement with regard to rotation type arrangement has values 1, 2 and 3. In this scale, the maximum score was 3 and minimum score was 1. All the 2 statements were positive statements. (Appendix I)

**CHECK LIST**

The tool checklist for the availability of equipments in zoology at eleventh and twelfth standard was prepared by investigator. The check list for the availability of materials in XI standard zoology consists of four categories of items such as,

a) Invertibrates and vertebrates (slides and specimens)
b) Equipments and other materials
c) Glasswares and
d) Chemicals
The check list for XII standard, availability of materials consists of four categories of items such as

a) Important organs of sheep, Endocrine glands of mammals and Frog developmental stages (specimens/slides)

b) Equipments and materials

c) Glasswares and

d) Chemicals.

In this check list number of items were 32 and 49 respectively for eleventh and twelfth standard. For the basic facilities available in zoology laboratory, number of items were 10. The last part of the questionnaire is on size of the zoology laboratory. Total number of items were two i.e. length of the laboratory and breadth of the laboratory (Appendix II).

STATISTICAL TECHNIQUES EMPLOYED FOR ANALYSIS

The collected data were analysed qualitatively and quantitatively. The programmes appropriate to the objectives of the study were made use of in the analysis of data. The following quantitative statistical techniques were employed for analysing the data.

i) t-test

ii) Analysis of Variance

iii) Scheffe test and

iv) Chi-square test
For the analysis of (i) syllabus and (ii) text book, qualitative analysis has been employed. Syllabus for eleventh and twelfth standards have been appended. (Appendix III and IV).

DELIMITATIONS

The investigation was delimited in the following aspects.

1. The study was conducted for eleventh and twelfth standard zoology in the higher secondary schools of Kanyakumari, Tirunelveli and Thoothukudi districts.

2. This study was confined to 150 higher secondary schools in Kanyakumari, Tirunelveli and Thoothukudi districts.

3. This study was delimited to government, aided and unaided higher secondary schools following the State Board syllabus in Kanyakumari, Tirunelveli and Thoothukudi districts. Hence the schools of Central Board of Secondary Education and Matriculation did not come under the perview of this investigation.

4. The study has excluded special schools in three districts.

5. The study did not include any other science group than zoology and

6. The study did not include Central Schools and Public Schools.

The ensuing chapter deals with the analysis of data.