CHAPTER IV

METHODOLOGY

4.1 INTRODUCTION

The review of related literature has given an insight to the researcher to design his research – “The Methodology”. Methodology is a mapping strategy. It is essentially a statement of the object of the inquiry and the strategies for collecting the evidences, analyzing the evidences and reporting the findings. It involves the systematic procedures by which the researcher starts from the initial identification of the problem to its final conclusions. Further a researcher should be able to either accept or reject his hypotheses through his design. To accomplish this, the design of the study for the present study is described in the succeeding chapters.

4.2 STATEMENT OF THE PROBLEM

The process of learning in the rural and urban areas is not the same. In most of the rural and urban high schools there are no pressure groups to fight for the improvements in the quality of education. In this age of knowledge explosion a lot proportion of pupils from these schools select Arts stream after their secondary level. This shows that pupils of rural and urban schools are deprived of certain learning activities that influence their right brain domains - Creativity, Problem Solving Ability and Attitudes.

The present study intends to study whether the levels of Creativity, Problem Solving Ability and Attitude towards Science is adequate enough or can be fostered through Synectics Model of Teaching Science.

The problem selected for the present investigation is stated as follows

“Effect of Synectics Model of teaching on Creativity, Problem Solving Ability and Attitude towards Science at Secondary level”.
4.3 OBJECTIVES OF THE STUDY

The following are the objectives of the study.

1. To compare the effectiveness of Synectics Model and Conventional Method of teaching science in terms
   
   • fostering Fluency,
   • fostering Flexibility,
   • fostering Originality,
   • fostering Composite Creativity,
   • Inducing Problem Solving Ability, and
   • Inducing Positive Attitude towards Science.

2. To compare the effectiveness of Synectics Model and Conventional Method of teaching science among “Rural” and “Urban” students separately in terms of
   
   • fostering Fluency,
   • fostering Flexibility,
   • fostering Originality,
   • fostering Composite Creativity,
   • Inducing Problem Solving Ability, and
   • Inducing Positive Attitude towards Science.

3. To find out whether there is interaction effect of “Treatments (Groups)” (Afore said Teaching Models), “Gender”, “Locale” and “Levels of Students” (Determined on the basis of general mental ability) on
   
   • fostered Fluency,
   • fostered Flexibility,
   • fostered Originality,
   • fostered Composite Creativity,
   • Induced Problem Solving Ability, and
   • Induced Positive Attitude towards Science.

4. To find out whether the Post test and Delayed post test scores differ among the “Rural” and “Urban” students with reference to
   
   • fostered Fluency,
   • fostered Flexibility,
   • fostered Originality,
   • fostered Composite Creativity,
   • Induced Problem Solving Ability, and
   • Induced Positive Attitude towards Science through Synectics Model of teaching science.
5. To compare the levels of sustenance between **Rural** and **Urban** students with reference to
   - fostered Fluency,
   - fostered Flexibility,
   - fostered Originality,
   - fostered Composite Creativity,
   - Induced Problem Solving Ability, and
   - Induced Positive Attitude towards Science through Synectics Model of teaching science.

4.4 VARIABLES OF THE STUDY

The variables used in the study are classified into independent, dependent and moderate variables.

1. Independent Variables
   - Conventional Method of Teaching by the Class Teacher
   - Synectics Model of Teaching by the Investigator

2. Dependent Variables
   - Fluency
   - Flexibility
   - Originality
   - Composite Creativity
   - Problem Solving Ability
   - Attitude towards Science

3. Moderate Variables
   - Levels of Students
   - Gender
   - Locale

4.5 OPERATIONAL DEFINITIONS

A number of terms and concepts have been used in the study. To convey the specific meaning an attempt has been made to explain in what sense these terms and concepts have been used in the present study.
Independent Variables

♦ Conventional Method of Teaching

This method of teaching is text book centered, teacher dominant. The emphasis here is mainly in remembering and reproducing of science facts, principles and theories. The students are passive listeners and do not participate actively in the teaching – learning process. This method is by and large being used by secondary school teachers at present.

♦ Synectics Model of Teaching

Synectics Models is an instructional procedure which involves use of analogies. In synectic exercises students play with analogies until they relax and begin to enjoy making more and more metaphoric comparisons. Then they use analogies to attack the problem or ideas. It leads the students into a slightly illogical world to give them the opportunity to invent new ways of seeing things, expressing themselves and approaching to solve problems.

Dependent Variables

♦ Creativity

It is a process where the individual locates gaps in ideas, thinks of alternative solutions to a problem, persists in idea, does not easily agree to what usually is thought to be correct and has unique ways of thinking or doing. Fluency, Flexibility and Originality are the three components of creativity under this study.

A combination of these three components forms Composite creativity.

➢ Fluency

Fluency is represented by number of relevant and unrepeated ideas which the tested produces. Relevance is judged on the basis of the appropriateness of the response when considered in relation to the test problem. An unrepeated idea is one which has been expressed only once under a given problem. Thus it is the

- Generation of as many as verbal ideas, responses, solutions, questions or suggestions
- Number or Quantity of relevant responses or ideas.
Flexibility

Flexibility is represented by a person’s ability to produce ideas which differ in approach or thought trend. All ideas which fall under one category of approach or thought trend are treated as one for purposes of flexibility scoring. Thus it is further operationally defined as

- Generation of a variety of ideas, questions, causes and solutions, as indicated by shifts in approaches or changes in direction of thinking like giving different uses of objects, different interpretations of a picture, story or different possibilities for solving a problem.
- Shifts trains of thought to avoid becoming locked into one track (J.P. Guilford and E. Paul Torrance).
- Involves bisociate matrices or to bring unrelated aspects of experience together (J.P. Guilford and E. Paul Torrance)
- It is the ability to make “Familiar Strange” (J.P. Guilford and E. Paul Torrance).

Originality

Originality represents

- Thinking of unusual, uncommon, novel and off – the – beaten – track ideas, questions, suggestions, solutions, or ways of doing things as a result of seeing new relationships among ideas, combining remote ideas, stretching beyond the obvious and commonplace, improving things on new lines and looking at the same thing from a new angle.
- The ability to see what most people do not. It is the acceptance of bisociation (J.P. Guilford and E. Paul Torrance).

Problem Solving Ability

Problem Solving Ability is the ability of a person to apply his past experience to arrive at a solution not previously known to the person – at least in the particular situation presented. In other words it is the ability of an individual to use acquired knowledge, skills and understanding to satisfy the demands of an unfamiliar situation. The individual must synthesize the knowledge and apply it to the new and different situation.
♠ ATTITUDE TOWARDS SCIENCE

Attitude towards science indicates feelings of an individual or a group concerning science - like faith in scientific method, opinion about scientists, value of science, interaction of science with individual and society, opinion held about science related social issues. It is the tendency to react favorably or unfavorably towards science or in science. Hence attitude towards science is the generalized attitude the universe of science content exerts upon the subject and being measured in terms of its favorableness estimated from the scores obtained by the subject on an “Attitude Scale towards Science”.

Moderate Variables

♠ Levels of Students

“Levels of the students” is decided based on the General Mental Ability and Mental Ability in Science scores obtained from Raven’s Standard Progressive Matrices and Sansanwal and Anuradha Joshi’s “Test of Higher Mental Ability in Science”. The levels of students chosen for the study being “Above Average”, “Average” and “Below Average”.

♠ Gender

It refers to boys and girls of Class IX in Rural and Urban secondary schools.

♠ Locale

Students of Class IX from Rural and Urban secondary schools viz., Zilla Parishad High Schools, Private aided schools, Municipal High Schools and Government High Schools.

Interaction

It is the differential response to one factor in combination with varying levels of second factor applied simultaneously. In other words, interaction is an additional effect due to the combined influence of two or more factors.

General Mental Ability

It is the ability of a person to apprehend, observe and conceive relation and develop systematic method of reasoning which indicates his capacity for intellectual activity and clarity in thinking.
4.6 HYPOTHESES OF THE STUDY

The following hypotheses are stated for testing their significance.

1. The effectiveness of Synectics Model and Conventional Method of teaching science does not differ in terms of
   - fostering Fluency,
   - fostering Flexibility,
   - fostering Originality,
   - fostering Composite Creativity,
   - Inducing Problem Solving Ability, and
   - Inducing Positive Attitude towards Science.

2. The effectiveness of Synectics Model and Conventional Method of teaching science on “Rural” and “Urban” students does not differ in terms of
   - fostering Fluency,
   - fostering Flexibility,
   - fostering Originality,
   - fostering Composite Creativity,
   - Inducing Problem Solving Ability, and
   - Inducing Positive Attitude towards Science.

3. There is no significant interaction effect of “Treatments (Groups)” (Afore said Teaching Methods), “Gender”, “Locale” and “Levels of Students” (Determined on the basis of general mental ability) with reference to
   - fostered Fluency,
   - fostered Flexibility,
   - fostered Originality,
   - fostered Composite Creativity,
   - Induced Problem Solving Ability, and
   - Induced Positive Attitude towards Science.

4. The Post-test and Delayed post-test scores do not differ among the “Rural” and “Urban” students with reference to
   - fostered Fluency,
   - fostered Flexibility,
   - fostered Originality,
   - fostered Composite Creativity,
   - Induced Problem Solving Ability, and
   - Induced Positive Attitude towards Science through Synectics Model of teaching science.
5. **Rural** and **Urban** students do not differ in their “Levels of Sustenance” with reference to
   - fostered Fluency,
   - fostered Flexibility,
   - fostered Originality,
   - fostered Composite Creativity,
   - Induced Problem Solving Ability and
   - Induced Positive Attitude towards Science through Synectics Model of teaching science.

4.7 **SAMPLING PROCEDURE**

The sample for the study is selected by means of cluster random sampling technique.

**URBAN SAMPLE**

Kadiri is a Municipal Corporation with a population around One and half lakh. There are about 18 Government, Zilla Parishad, Municipal and Private high schools that were recognized by the Government of Andhra Pradesh.

**RURAL SAMPLE**

Surrounding Kadiri are nearly 10 rural revenue areas, spreading in a radius of 25 kilometers. Every rural block is called “Mandal”. Every mandal has at least a high school.

4.7.1 **Selection Of School**

**URBAN SCHOOL**

All the schools in Kadiri are listed which satisfy the following criteria:

- The schools should have at least a strength of 75 in Class IX
- The school should be located in the town.
- It should draw a good number of students of both genders from the town populace.
- It should have lab facility.
- The head of the institution is inclined to allow the researcher.
- It should have a regular science teacher teaching Class IX.
RURAL SCHOOL

All the schools in Rural Mandals are listed which satisfied the following criteria:

- The schools should have at least a strength of 75 in Class IX
- The school should not be located by the side of the state highway.
- The school should be located in the rural interior (at least 10 kms interior from the state highway).
- It should draw a good number of students of both genders from the rural or tribal populace.
- It should have a regular science teacher teaching Class IX.
- It should be devoid of lab facilities.
- The head of the institution is inclined to allow the researcher.

The SAMPLE SCHOOLS that met with the above criteria, from each area, are selected randomly.

URBAN SAMPLE SCHOOL

Kadiri is a Municipal Town with a population around one and half lakh. There are about 18 Government, Zilla Parishad, Municipal and Private high schools that were recognized by the Government of Andhra Pradesh. Among these schools, the Municipal High School, Kutagulla, Kadiri is selected randomly as urban school for conducting the study.

RURAL SAMPLE SCHOOL

Kadiri Revenue division consists of 10 Rural revenue areas, spreading in a radius of 25 kilometers which are known as “Revenue Mandals”. Every Revenue mandal has at least a high school. Out of these 10 Revenue Mandals, the Zilla Parishad High School in Nallamada Revenue Mandal is selected randomly for the study. Nallamada is an interior rural mandal about 18 kilometers from the state highway. It is a declared rurally backward area both educationally and economically. The school in this mandal has all the features to be called a rural high school.
4.7.2 Selection Of Class

The experimental treatment involves the metaphoric activity of Synectics model of teaching. The selected students should have fair vocabulary for suggesting, playing and making comparisons with analogies as per the syntax of the Synectics model.

The Ninth grade students are under the age group of 14-15 years. They would have transited into Piagetian formal operational stage. Students in this stage are capable of hypothetical and propositional thoughts, reflective thinking, abstract conceptual and logical thinking and other mental tasks that challenge them. As the study intends to investigate into the effect of synectics model on development of Problem solving abilities and formation of favorable attitude towards science, the Ninth grade students are found to be appropriate sample for the study.

4.7.3 Obtaining Two Parallel Groups

THE URBAN AND RURAL PARALLEL GROUPS

All the students of the ninth grade in the selected Urban and Rural High schools were administered with Raven’s Standard Progressive Matrices Test (SPM) (Annexure I) and the “Test of Higher Mental Ability in Science” (THMAS) in Science by Sansanwal and Anuradha Joshi [Annexures II (English Version) and III (Telugu Version)].

The scores on SPM and THMAS are transformed into McCall’s T scores because it helps to locate the level of performance, of the subjects in a large sample, on a Mental Ability Test. Based on the T scores the students are divided into two groups each of equal mental abilities in Urban and Rural samples. These four groups formed matched pairs based on the above mental ability scores.

Of the two groups in each of the Urban and Rural samples one is chosen as “Experimental Group” and the other as “Control Group” based on draw of lots. Thus equality is established between two groups i.e. “Experimental group” and “Control group”.
4.7.4 Constitution Of Levels

The “Experimental” design needed three levels of students from the sample. So the composite ‘T’ scores on SPM and THMAS of each group were arranged in descending order and the levels are decided as follows.

Table 4.1: Table showing constitution of Levels and Numbers

<table>
<thead>
<tr>
<th>Locale</th>
<th>Sex</th>
<th>Level</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>URBAN Or RURAL</td>
<td>Boys</td>
<td>“High Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Average Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Low Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>“High Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Average Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Low Ability Level”</td>
<td>05</td>
</tr>
<tr>
<td>TOTAL (For each parallel group)</td>
<td></td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

The diagrammatic representation of the sampling procedure is given below.

Figure 4.1: Diagrammatic Representation of Sampling Procedure
4.8 PREPARATION FOR THE EXPERIMENT

• CONSTITUTION OF PANEL

The faculty in Regional Institute of Education, Mysore who are teaching Models of teaching and a group of B.Ed., College lecturers who had the knowledge of Models of Teaching. (Annexure IV) formed a panel to select the topics for Synectics Model of Teaching and the corresponding analogies to be selected. The panel has arrived at a format of Synectics lesson plan on Strategy Two - “Making Strange Familiar”. The format was published in the training manual “Techniques and Strategies of Teaching at Secondary Level” prepared by the Project Team, Regional Institute of Education (NCERT), Mysore (2001).

The panel has also decided to select the topics that form the part of the syllabus in the respective calendar months. (Annexure XXIV)

• SYNECTICS LESSON PLANS HAND BOOK

Based on the format, the lesson plans were prepared for the selected topics. These lesson plans were placed before the Guide, a panel of researchers, and an expert scrutiny.

As per the suggestions of the panel, the prepared lesson plans were trialed in Harish High School, Kadiri to identify the lacunae in delivering the syntax of the Strategy - II of Synectics Model. This helped the researcher to improvise the Metaphoric Activity phase of the model. It also helped the researcher to select better analogies for the selected topics.

After the trial the researcher prepared the final draft of the lesson plans on fifteen topics in Physics, Chemistry and Biology. This formed the “Synectic Lesson Plan hand Book”. Sample Lesson Plans were given in the Annexures V and VII.

• PREPARATION OF WORK SHEETS

For all the fifteen topics, work sheets are prepared in relation to the phases of the model. These worksheets are filled by the experimental students and they serve as a testimony to their active participation in the metaphoric activity. A sample worksheet was given in Annexures VI and VIII.
• **PREPARATION OF EVALUATION SHEET**

An Evaluation sheet for Synectics Model of Teaching Science, availed from “Instructional Models – Strategies for Teaching in a Diverse Society – Thomas J. Lasley II, Thomas J. Matczynski and James B. Rowley (2002),is adopted to assess the even delivery of all the sessions for Rural and Urban experimental samples. The observers were either the Head master or the subject teacher in the respective school. The observers were given orientation about the syntax of the model. The sample evaluation sheet was given in Annexure X.

• **STRETCHING EXERCISES**

Stretching exercises provide experience with the two types of metaphoric activity in this model of teaching. But as said by Bruce Joyce and Marsh Weil (1997), they are not related to any particular problem situation, nor do they follow a sequence of phases. These teach the students the process of metaphoric thinking before asking them to explore a concept. The students are simply asked to respond to ideas. The stretching exercises are conducted in “Direct Analogy” and “Personal Analogy”. As the sample for study includes the rural and urban students, the panel advised to conduct “Eight sessions” of stretching exercises to facilitate the students into the process of metaphoric activity.

➢ **DIRECT ANALOGY**

- A Banana is like what living thing?
- A House is like a Brain.
- A Pomegranate is like a medical store.
- A Father is like a Car.

➢ **PERSONAL ANALOGY**

- Be a Pen
  1. How are you?
  2. What are you doing?
  3. How would you like to be?
  4. How you feel being a pen?
  5. What things do you like to change in this world?
- **Be a Cloud**
  1. Where are you?
  2. What are you doing?
  3. What would you like to do?
  4. What are your feelings - when in the sky?
  5. What are your feelings - while raining?
  6. How many forms you appear?

- **Be a Cycle**
  1. How are you?
  2. Where are you going?
  3. How you feel?
  4. Do you suffer? How? Why?
  5. Are you happy? Why?
  6. What improvements you like to be made for you?

- **Be a Flower**
  1. How are your petals?
  2. How do you look like?
  3. How do you smell?
  4. What fruits do you like to give?

The panel has also advised to prepare work sheets for the above stretching exercises as a testimony for the active involvement by the learners. The blank and the filled in response sheets of the “Stretching exercises” were given in Annexure XI.

**4.9 CONDUCTION OF THE EXPERIMENT**

The experimental group is subjected to treatment for a period of one and a half month on alternative days. The period of treatment includes Pre-testing, Stretching exercises, Synectics Method of teaching and Post – testing. The rural and urban experimental groups are subjected to treatment at the same hours i.e. morning sessions out - of school hours.

Following is the sequence of conducting the experiment.

➢ **PRE-TESTING**

The Experimental and Control groups were Pre - Tested on Verbal Test of Creative Thinking (VTCT), Problem Solving Ability (PSAT) and Science Attitude Scale (ATS) to assess the pre treatment levels of Creativity, Problem Solving Ability and Attitude towards Science.
THE TREATMENT

The Experimental groups were subjected to Treatment - “The Synectics Model of Teaching Science” in the following steps.

STEP - 1 - STRETCHING EXERCISES

The Experimental groups were warmed up with stretching exercises on Metaphoric Activity through four sessions each on “Direct Analogy” and “Personal Analogy”. During stretching exercises the subjects are given with work sheets to record their responses (Annexure XII).

STEP - II - SYNECTICS MODEL OF TEACHING SCIENCE

After the warming up - stretching exercises, the Experimental group was taught with fifteen sessions of “The Synectics Model of Teaching Science” on selected topics five each from Physics, Chemistry and Biology.

“The Synectics Model of Teaching Science” sessions included recording the student transition from one phase of the model to the other in a work sheet intended for Group work. The students were divided into Six groups of five each to fill in the worksheets. Care was taken that students of all levels mingle in each group.

The Synectics Model of teaching science sessions were conducted on every alternative (The first day on Urban sample and the second day on Rural sample, and so on.) day except the Sundays. The schedule of Experimentation is given at Annexure XIII. F1. The Treatment sessions are conducted out of the school working hours to avoid the interference, observation and interaction of control group members with experimentation process. Thus, rendering a congenial climate for experimentation. Everyday Synectics sessions on Rural and Urban Experimental samples, are conducted as per the following schedule

Table 4.2: Schedule of Experimentation

<table>
<thead>
<tr>
<th>Locale</th>
<th>Days</th>
<th>Timings</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL</td>
<td>Monday</td>
<td>Wednesday</td>
</tr>
<tr>
<td>URBAN</td>
<td>Tuesday</td>
<td>Thursday</td>
</tr>
</tbody>
</table>
The Control group is taught on Teacher dominant - Conventional Method by the regular science teacher in the respective sample schools during the school hours. The Head Master of the respective schools formed the chief observers. They had observed the teaching sessions of the “Regular Science Teachers” and assessed the Outstanding Features of the “Synectics Model of Teaching Science”. Both the headmasters of Rural and Urban sample schools did not differ in their Positive Opinion on the Synectics Sessions. They had taken the photocopies of the investigators’ lesson plans and work sheets for further implementation. The Regular teachers were not given any idea about the analogy for the next sessions even if they insisted. Hence, it could be assuaged that the “Synectic Metaphoric Activity” was exclusively performed by Experimental groups only. (The list of generated analogies are given in Anneuxre XXIV.)

**STEP - III - RECORDING IN SYNECTICS EVALUATION SHEET**

The adopted Evaluation Sheet is recorded by the observers with the proceedings of the Synectics Model of Teaching Science, to assess the even delivery of all the sessions for Rural and Urban experimental samples.

- **POST - TESTING**

Soon after the treatment both the Experimental and Control groups are Post-Tested on Verbal Test of Creative Thinking (VTCT), Problem Solving Ability (PSAT) and Science Attitude Scale (ATS) to assess the post treatment levels of Creativity, Problem Solving Ability and Attitude towards Science.

- **DELAYED POST - TESTING**

After a gap of one month of the treatment, the Experimental groups are Delayed Post-Tested on Verbal Test of Creative Thinking (VTCT), Problem Solving Ability (PSAT) and Science Attitude Scale (ATS) to assess the sustenance levels of fostered Creativity, Problem Solving Ability and Attitude towards Science.

The schedule of experimentation in the Rural and Urban Schools is given at Appendix – IV

The procedure followed in the conduct of the experiment is schematically shown in the following page.
Figure 4.2: Diagrammatic Representation of Experimentation Process
4.10 STATISTICAL TECHNIQUES USED

The study was experimental in nature. It primarily has three major factors. “The Gender” (A), “The Locale” (B) of students and “The Treatment” (C) on the students in three levels (p, q, and r) are the major factors. Therefore the design is designated as “p x q x r” factorial experiment. In this design it is possible to evaluate the first-order or two-factor interaction effect as well as the second-order or three-factor interaction effect.

GENERAL LAYOUT OF THE “p x q x r” FACTORIAL DESIGN

The general layout of the three factor factorial design is as follows. The researcher considers the case with equal cell frequencies. The general layout of the factorial design, having three fixed factors, A, B, and C, and levels p, q, and r respectively is presented in the table form.

<table>
<thead>
<tr>
<th>RURAL</th>
<th>CONVENTIONAL METHOD OF TEACHING</th>
<th>SYNECTICS MODEL OF TEACHING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TREATMENT</td>
<td></td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>BOYS</td>
<td></td>
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<td>L_1</td>
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<td>L_1</td>
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<td>L_2</td>
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<td>L_3</td>
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<td>L_3</td>
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<tr>
<td>GIRLS</td>
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<td>URBAN</td>
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<tr>
<td>GIRLS</td>
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<td>L_2</td>
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<tr>
<td>L_3</td>
<td></td>
<td>L_3</td>
</tr>
</tbody>
</table>

The following statistical techniques are used to analyze the numerical data obtained from the samples of the study.

1. Analysis of Variance – One way; Two way and Three way

The analysis of variance deals with variances rather than with standard deviations and standard errors. The technique is useful in testing differences between two or more means. One way; Two way and Three way Analysis of variance technique was used to test the significant difference between groups, genders, location, and the interaction effects.
2. t-test

The t-test of significance is adequate when we want to determine whether or not two means differ significantly from each other. It is employed in experiments involving only two groups. It is also used to know whether the immediate post-test and delayed post test scores differ significantly with reference to dependent variables.

4.11 DELIMITATIONS OF THE STUDY

Following delimitations were the self imposed restrictions by the investigator due to paucity of time, limited availability of resources and several other aspects that cannot be covered in the present study due to practical constraints.

- The study was delimitated to Telugu Medium schools in Urban and Rural areas.
- The study was restricted to the teaching of science for IX class.
- The study was confined to the selected Rural and Urban schools.
- The study was confined to selected topics related to June – September period syllabus in Ninth class only.
- The study was restricted to strategy – II “Making the Strange Familiar” approach – in Synectics Model.
- The study was delimited to IX class students of 2006-2007 academic year only.
- Creativity has several measurable components like – Fluency, Flexibility, Originality, Elaboration, Figural creativity; Symbolic creativity, Semantic creativity etc. The present study was delimited to measure Fluency, Flexibility and Originality components of Creativity only.
- The study was limited to the regular science teacher’s teaching abilities in the selected Rural and Urban schools.
- The study was delimited to Baquer Mehdi’s Verbal Test of Creativity only.

A well knit Methodology – “The Heart” needed appropriate “Tools” – “The Blood” for collecting the data.

Hence, the “Development of Tools” was discussed in the Chapter - V.