CHAPTER VII

SUMMARY OF THE STUDY, FINDINGS AND CONCLUSIONS

7.1 INTRODUCTION

Intellectuals have made a clarion call that fewer and fewer young students show any interest in creative work especially that that relates to science and technology. A trend of senior secondary students shying away from the “science stream” reflects the poor state of health regarding the pedagogy of science (Kalra R.M., 1995). In order to “turn on” students towards science, it is imperative to bring a change in our approach to teaching science.

The main aim of teaching science at the school level is to develop scientific attitudes, raise scientific and technological competence, encourage creativity and solve problems relating to the daily lives of students in and out of school.

The seventh Regional Consultation Meeting on APIED (UNESCO, Bangkok) suggested the role of science teaching in the school systems of the developing countries in the following paragraph.

“Special attention will be given to the development of ‘open competence’, the nurturing of talent, and creating a climate supportive of scientific and technological creativity through fostering awareness and public understanding of science and technology and their implications”.

The study by H.S. Srivastava (1996) has found that people are of the opinion that schools and universities have failed in making individuals productive thinkers. The neurological studies by Roger Sperry and others emphasize the importance of right brain oriented curriculum.

The theorists of the unconscious stressed on the legitimization of fantasy and daydreaming leading to increased creativity. The intellectuals have called for “the true education” that facilitates the student “HOW” to think out things for him.
The professional teachers and educational researches urged a try at combining the creative thinking approaches with curricular content to bring the excitement of inquiry into the classroom.

J.J. Gordon’s research has verified that children can be taught directly about the process of creativity as a way of increasing their innovative capacity. Research studies indicate that the rural and urban students differ in their learning processes.

The above information emphasizes the need to frame a research study that involves teaching curricular content in creative approach that fosters life skills in the rural and urban learners alike.

7.2 NEED AND IMPORTANCE OF THE STUDY

In a country of billion persons, as India, enough creative persons are available and a sizeable number amongst these would be school going children. The paradox of the situation is that in India mostly students are not given the opportunity of developing creative maturity throughout their entire school career (Aggarwal, 1999).

Thus, there is a need to harness their creative powers and cultivate in them creative habits for the ultimate benefit of the society. Certain innovative learning strategies facilitate the growth of above qualities.

“SYNECTICS” is a teaching model, developed by William J.J. Gordon, to “Enhance Creative Thought” which helps to develop Problem Solving Abilities and Favorable Attitudes towards Learning (Passi, 1990). While selecting the Synectics Model of Teaching the following were the observed criteria:

✔ It fosters Creativity as – “Disinhibition”
✔ It increases pupil’s tendency to combine things in a new ways and to see relatedness among divergent stimuli (Isen, Daubman, and Nowicki, 1987).
✔ It adopts playful attitude – thus “Suspending Judgment”.
✔ Breaks the monotony of the conventional classroom teaching.
✔ Democratic and Interactive in approach. Suits to explore individual differences.
✔ Applicable, functional and workable in Indian settings.
✔ Emphasizes both processes of skills and knowledge of the content.
In addition to the above, a review of related literature emphasized that very few studies worked on the effectiveness of Models of teaching – especially with reference to Synectics – strategy – II i.e. “Making Strange Familiar”. Further, no study is found to have compared the effectiveness of Synectics on Rural and Urban learners. This is the major research gap. In order to contribute to this gap an attempt is made by undertaking the present study. Hence, the present study has significance in giving certain educational implications.

7.3 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, Problem Solving Ability and Attitude towards Science is adequate enough or can be fostered through Synectics Model of Teaching Science.

The present study intends to find 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.

“Effect of Synectics Model of Teaching on Creativity, Problem Solving Ability and Attitude towards Science at Secondary level”.

7.4 REVIEW OF RELATED LITERATURE

The studies reviewed have been classified under eight headings.

1. Studies related to Role of analogies in learning
2. Studies related to Fostering creativity
3. Studies related to Inducing Problem Solving Ability
4. Studies related to Attitude towards Science
5. Studies related to Models of teaching in general
6. Studies related to Training strategy for models of teaching
7. Studies related to Developing models for teaching
8. Studies related to Synectics model of teaching
The research in the models of teaching, in particular, is in the exploration stage. Among the four families of Models of teaching, research on Personal Models family is recent in origin. “Synectics” from the personal models family is the best-suited model to foster Creativity, besides it nurtures Problem-solving ability.

From the review it is found that there are very few studies conducted on Synectics Model of teaching and is generally receiving due importance.

There are two strategies of teaching in Synectics Model, and the second strategy is effective in Indian settings at secondary school level.

From the review it is evident that the studies were conducted at secondary level in Metropolitan English Medium schools, no study is found with reference to Urban and Rural Secondary schools, no attempt was made to find the effect of Synectics Model of teaching Science in the regional languages and no study has attempted to find the combined effect of Synectics Model of Teaching on Creativity and Problem Solving Ability on Attitude towards Science. Hence, the present research study becomes a modest venture in reducing the gap.

7.5 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.

7.6 HYPOTHESES OF THE STUDY

The following null 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 among “Rural” and “Urban” students taken separately 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 between the “Treatments (Groups)” (Afore said Teaching Models), “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 does 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.

7.7 VARIABLES OF THE STUDY

The variables used in the study are classified as follows.

1. Independent Variables
- Conventional Method of Teaching (Control Group) – By Regular teacher
- Synectics Model of Teaching (Experimental Group) – By the Investigator
2. Dependent Variables
   - Fluency
   - Composite Creativity
   - Attitude towards Science
   - Flexibility
   - Originality
   - Problem Solving Ability

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

7.8 DESIGN OF THE EXPERIMENT

Figure 7.1: Diagrammatic Representation of Experimentation Process
7.9 SAMPLING PROCEDURE

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

URBAN SAMPLE

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

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. The school in this mandal has all the features to be called a rural high school.

7.10 SELECTION OF CLASS

Ninth class students from the above schools formed the sample for conducting the experiment – ‘The Synectics Model of Teaching Science” because the experimental treatment involved 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 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.
7.11 OBTAINING TWO PARALLEL GROUPS

The diagrammatic representation of the sampling procedure for the establishment of “Parallel Groups” is given in the following page.

Figure 7.2: Diagrammatic Representation of Sampling Procedure

[Diagram showing the sampling procedure with four parallel groups]
Table 7.1: Constitution of Levels in each group based on T – Scores of Raven’s Standard Progressive Matrices Test (SPM) and Dr. Sansanwal and Dr. Anuradha Joshi’s “Test of Higher Mental Ability in Science” (THMAS)

<table>
<thead>
<tr>
<th>Locale or RURAL</th>
<th>Sex</th>
<th>Level</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>“Above average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Below average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>“Above average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Below average Level”</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>TOTAL (For each parallel group)</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

7.12 TOOLS USED FOR THE STUDY

The tools selected and developed for the study are given below in tabular form

Table 7.2: The different tools adopted and their – Reliability and Validity

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the tool</th>
<th>Author</th>
<th>Kind of Reliability</th>
<th>Kind of validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standard Progressive Matrices Test (SPM)</td>
<td>Raven (1938)</td>
<td>Test – Retest 0.8/0.93</td>
<td>Concurrent Validity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consistent Reliability 0.87/0.97</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Test of Higher Mental Ability in Science (THMAS)</td>
<td>Dr. D.N. Sansanwal and Dr. Anuradha Joshi (1989)</td>
<td>Test – Retest 0.816</td>
<td>Concurrent Validity</td>
</tr>
<tr>
<td>3</td>
<td>Verbal Test of Creative Thinking (VTCT)</td>
<td>Baqer Mehdi (1973)</td>
<td>Test – Retest 0.59/0.89</td>
<td>Concurrent Validity</td>
</tr>
<tr>
<td>4</td>
<td>Attitude towards Science Scale (ATS)</td>
<td>Avinash Grewal</td>
<td>Test – Retest 0.75</td>
<td>Content and Concurrent Validity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Split Half 0.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PROBLEM SOLVING ABILITY TEST (PSAT)</td>
<td>By the Investigator</td>
<td>Item Reliability (Hyt’s) 0.71</td>
<td>Item Validity (Tetrachoric)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Split Half (Phase-II) 0.787</td>
<td>Content Validity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Split Half (Phase-III) 0.685</td>
<td>Construct Validity (Sheela, 2000)</td>
</tr>
</tbody>
</table>
7.13 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 delimited 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 delimitied 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 delimitied to Baquer Mehdi’s Verbal Test of Creativity only.

7.14 STATISTICAL TECHNIQUES EMPLOYED

The following statistical techniques are used to analyze the data and for testing the formulated hypotheses of the study.

1. Analysis of Variance (F-test)

ANOVA technique (One–Way; Two–Way and Three-Way) is used to test the differences between two or more means. It is also used to test the significance of interaction effect of various variables like Location, Sex and Levels of the students.

2. t-test

It is used to know the significant difference between the “Pre-test and Post-test”; “Post-test scores of the control and experimental groups” and “Post-test and Delayed Post-test”.
7.15. FINDINGS OF THE STUDY

The Findings of the Study are given under the respective heads.

7.15.1 COMPARISON OF PRE TEST SCORES ON THE DEPENDENT VARIABLES

1. The Rural Experimental and Control groups did not differ significantly with reference to
   Fluency – a component of Creativity,
   Flexibility – a component of Creativity,
   Originality – a component of Creativity,
   Composite Creativity and
   Problem Solving Ability.

2. The Urban Experimental and Control groups did not differ significantly with reference to
   Fluency – a component of Creativity,
   Flexibility – a component of Creativity,
   Originality – a component of Creativity,
   Composite Creativity and
   Problem Solving Ability.

Discussion

The Rural and Urban – Experimental and Control groups did not differ significantly on the dependent variables. They were alike further confirming appropriateness of the parallel groups constitution. As the groups were alike, their entry behavior was alike before the treatment. Hence, it was further concluded that the difference noticed in the dependent variables after the treatment – “Synectics Model of teaching Science”, could be attributed to it alone.

7.15.2 FINDINGS RELATED TO FLUENCY – A COMPONENT OF CREATIVITY

RURAL SAMPLE

1. The “Rural Experimental Group” and the “Rural Control Group” differ significantly in terms of post treatment Fluency – a component of Creativity.

2. “There is significant effect of Synectics Model of Teaching Science in terms of fostering Fluency – a component of Creativity, on Rural Experimental Students”.
3. There is a significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Fluency – a component of Creativity in Rural students.

4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Fluency – a component of Creativity in Rural students.

5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Fluency – a component of Creativity in Rural students.

6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Fluency – a component of Creativity in Rural Experimental students.

**Discussion**

Even when the Pre-Test and Post-test scores on Fluency were compared the rural experimental group taught through Synectics Model had better $t$– value (8.31*) over the control group – taught by Conventional Method (6.39*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Fluency – a component of Creativity.

The finding that Rural Boys and Rural Girls did not differ significantly with reference to post Fluency – a component of creativity was in agreement with the findings of Hussain and Hussain (1975), Dutta (1982), Badrinath and Satyanarayana (1979), Reddy Sudhakara (1990). Though the findings of the investigators’ mentioned above were based on a survey – the existent equality between the rural genders were comparable with the findings of the present investigator. The interaction effect between the Genders and Levels occurred as the Average ability boys and the Low ability boys had better mean scores on post Fluency than the High Ability boys. Among the former the Low ability boys had higher mean scores than the Average Ability boys. This trend further strengthens the effectiveness of Synectics Model of Teaching Science.
1. The “Urban Experimental Group” and the “Urban Control Group” differ significantly in terms of post treatment Fluency – a component of Creativity.

2. There is a significant effect of Synectics Model of Teaching Science in terms of fostering Fluency – a component of Creativity, in Urban Experimental Students”.

3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Fluency – a component of Creativity in Urban students.

4. There is no significant interaction effect of “Gender” and “Groups” on the post treatment Fluency – a component of Creativity in Urban Experimental students.

5. There is no significant interaction effect of “Levels of the Students” and “Groups” on the post treatment Fluency – a component of Creativity in Urban Experimental students.

6. There is no significant interaction effect of “Gender”, “Levels of the Students” and “Groups” over the post treatment Fluency – a component of Creativity in Urban Experimental students.

**Discussion**

Even when the Pre-Test and Post-test scores on Fluency were compared the urban experimental group taught through Synectics Model had better t – value (6.67*) over the control group – taught by Conventional Method (5.8*). Hence, it may further be concluded that there is a significant effect of Synectics Model of Teaching on Fluency – a component of Creativity.

The finding that Urban Boys and Urban Girls differed significantly with reference to Fluency – a component of creativity. The Urban boys had better mean scores than the other sex. This was in agreement with the findings of Strauss and Strauss (1968), Raina (1971), Nainatara (1981) and Dharmagandhan (1981) but contrary to Raina.K (1986). Though the findings of the investigators’ mentioned above were based on a survey – the existent difference between the urban genders were comparable with the findings of the present investigator. Most of the girls in the
present urban school were confined to their domestic duties most of the time. Though they were regular in attendance, were not time punctual. They were not able to produce a free flow of thoughts. The investigator noticed their inability to let themselves out of the box. Further no interaction effects were found between the moderate variables. This is because the fostered fluency was a function of their levels in both the genders.

**RURAL v/s URBAN INTERACTIONS**

1. There is no significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Fluency – a component of Creativity in Rural and Urban Experimental students.

2. There is a significant interaction effect of “Locality of the School” and “Gender” over the post treatment Fluency – a component of Creativity in Rural and Urban Experimental students.

3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Fluency – a component of Creativity in Rural and Urban Experimental students.

4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Gender” over the post treatment Fluency – a component of Creativity in Rural and Urban Experimental students.

**Discussion**

There is a significant difference between the Rural and Urban students with reference to post Fluency. Hence, it may be concluded that Synectics Model of teaching had better effectiveness on Urban experimental group. The trend is in agreement with the studies of Singh (1980), Dharmagandhan (1981) and Shukla (1982) but contrary to Torrance (1960), Sharma (1972 and 1974), Mehdi (1973) and Azmi (1974). Though the findings of the investigators’ mentioned above were based on a survey – the existential difference between the localities were comparable with the findings of the present investigator.
A significant interaction effect was found between “Locale and “Levels of the students”. This interaction effect is because of the better post Fluency mean scores observed in Rural – Low Ability and Average ability students.

7.15.3 FINDINGS RELATED TO FLEXIBILITY – A COMPONENT OF CREATIVITY

RURAL SAMPLE

1. The “Rural Experimental Group” and the “Rural Control Group” differ significantly in terms of post treatment Flexibility – a component of Creativity.

2. “There is a significant effect of Synectics Model of Teaching Science in terms of fostering Flexibility – a component of Creativity, on Rural Experimental Students”.

3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Flexibility – a component of Creativity in Rural students.

4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Flexibility – a component of Creativity in Rural students.

5. There is significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Flexibility – a component of Creativity in Rural students.

6. There is significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Flexibility – a component of Creativity in Rural Experimental students.

Discussion

Even when the Pre-Test and Post-test scores on Flexibility were compared the rural experimental group taught through Synectics Model had better t – value (7.42*) over the control group – taught by Conventional Method (6.3*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Flexibility – a component of Creativity.

The finding that Rural Boys and Rural Girls did not differ significantly with reference to Flexibility – a component of creativity was in agreement with the findings of Hussain and Hussain (1975), Badrinath and Satyanarayana (1979), Pandey and Pandey (1984), Reddy Sudhakara (1990).
The significant difference between the rural experimental and control groups had significant interaction effect on the levels of the students. This was because the Low Ability rural experimental students had better mean scores on post Flexibility than the others but a significant difference did not exist between the levels. Hence, it may be said a moderate interaction effect existed.

**URBAN SAMPLE**

1. There is no significant effect of Synectics Model of Teaching in terms of fostering Flexibility – a component of Creativity, on Urban Experimental Students.”
   - The above finding is based on statistical inference. But when the gain over the mean scores of Urban Experimental and Control Groups are compared, the Experimental group has shown higher gain (7.16) than the Control group (3.43). Thus, the gain in Flexibility by urban experimental group is attributable to treatment – Synectics Model of teaching Science.
2. The “Urban Experimental Group” and the “Urban Control Group” did not differ significantly in terms of post treatment Flexibility – a component of Creativity.
3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Flexibility – a component of Creativity in Urban students.
4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Flexibility – a component of Creativity in Urban Experimental students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Flexibility – a component of Creativity in Urban Experimental students.
6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Flexibility – a component of Creativity in Urban Experimental students.

**Discussion**

When the Pre-Test and Post-test scores on Flexibility were compared the urban experimental group taught through Synectics Model had less $t$ – value (5.8*) over the control group – taught by Conventional Method (6.72*). Hence, it may further be concluded that there is no significant effect of Synectics Model of Teaching
on post Flexibility – a component of Creativity. But when compared to experimental group’s performance alone Synectics Model of Teaching had significant effect on their post Flexibility.

The finding that Urban Boys and Urban Girls differed significantly with reference to Flexibility – a component of creativity. The Urban boys had better mean scores than the girls. This was in agreement with the findings of Strauss and Strauss (1968), Raina (1971), Nainatara (1981) and Dharmagandhan (1981). This is because the urban girls had less freedom of expression than the urban boys. The urban girls could not show variation in their trail of thoughts as the boys do.

**RURAL v/s URBAN INTERACTIONS**

1. There is no significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Flexibility – a component of Creativity in Rural and Urban Experimental students.

2. There is significant interaction effect of “Locality of the School” and “Gender” over the post treatment Flexibility – a component of Creativity in Rural and Urban Experimental students.

3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Flexibility – a component of Creativity in Rural and Urban Experimental students.

4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Gender” over the post treatment Flexibility – a component of Creativity in Rural and Urban Experimental students.

**Discussion**

There is no significant difference between the Rural and Urban students with reference to Flexibility. But the mean score of urban boys was higher than the rural counterparts. Hence a significant interaction effect found between “Locale and Genders”. The trend is in agreement with the studies of Singh (1980), Dharmagandhan (1981) and Shukla (1982) but contrary to Torrance (1960), Sharma (1972 and 1974), Mehdi (1973) and Azmi (1974). Though the findings of the
investigators’ mentioned above were based on a survey – the existent no difference between the localities were comparable with the findings of the present study.

7.15.4 FINDINGS RELATED TO ORIGINALITY – A COMPONENT OF CREATIVITY

RURAL SAMPLE

1. “There is significant effect of Synectics Model of Teaching Science in terms of fostering Originality – a component of Creativity, on Rural Experimental Students”.

2. The “Rural Experimental Group” and the “Rural Control Group” differ significantly in terms of post treatment Originality – a component of Creativity.

3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Originality – a component of Creativity in Rural students.

4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Originality – a component of Creativity in Rural students.

5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Originality – a component of Creativity in Rural students.

6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Originality – a component of Creativity in Rural Experimental students.

Discussion

An interesting trend was found when the Pre-Test and Post-test scores on Originality were compared the rural experimental group taught through Synectics Model had less t–value (6.62*) over the control group – taught by Conventional Method (14.0*). But when the gain in mean scores was observed the experimental group had better gain over the control group. Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Originality – a component of Creativity.

This finding is in agreement with the findings of Gordon (1971). While evaluating the educational use of Synectics, he found that it exerts significant change
in the two factors of creativity i.e. Originality and Elaboration than the rest of the factors – Fluency and Flexibility.

The finding that Rural Boys and Rural Girls did not differ significantly with reference to Originality – a component of creativity was in agreement with the findings of Hussain and Hussain (1975), Pandey and Pandey (1984), Reddy Sudhakara (1990) but contrary to Badrinath and Satyanarayana (1979).

**URBAN SAMPLE**

1. The “Urban Experimental Group” and the “Urban Control Group” differ significantly in terms of post treatment Originality – a component of Creativity.
2. There is significant effect of Synectics Model of Teaching Science in terms of fostering Originality – a component of Creativity, on Urban Experimental Students”.
3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Originality – a component of Creativity in Urban students.
4. There is significant interaction effect of “Gender” and “Groups” over the post treatment Originality – a component of Creativity in Urban students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Originality – a component of Creativity in Urban students.
6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Originality – a component of Creativity in Urban Experimental students.

**Discussion**

Even when the Pre-Test and Post-test scores on Originality were compared the urban experimental group taught through Synectics Model had less t – value (5.8*) over the control group – taught by Conventional Method (9.8*). But when the post Originality mean scores were observed the experimental group (73.03) had far better mean score over the control group (40.37). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Originality – a component of Creativity.
This finding is in agreement with the findings of Gordon (1971). While evaluating the educational use of Synectics, he found that it exerts significant change in the two factors of creativity i.e. Originality and Elaboration than the rest of the factors – Fluency and Flexibility.

The finding that Urban Boys and Urban Girls differed significantly with reference to Originality – a component of creativity. The Urban boys had better mean scores than the other sex. This was in agreement with the findings of Badrinath and Satyanarayana (1979) and contrary to Singh (1978), Pandey (1981). This is because the urban girls had less freedom of expression than the urban boys. The urban girls could not break their mindset to make newer imaginations and connections.

**RURAL v/s URBAN INTERACTIONS**

1. There is no significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Originality, – a component of Creativity, in Rural and Urban Experimental students.
2. There is significant interaction effect of “Locality of the School” and “Gender” over the post treatment Originality – a component of Creativity in Rural and Urban Experimental students.
3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Originality – a component of Creativity in Rural and Urban Experimental students.
4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Gender” over the post treatment Originality – a component of Creativity in Rural and Urban Experimental students.

**Discussion**

There was a significant difference between the Rural and Urban students with reference to Originality even between their Levels and Genders. The mean score of urban boys was far higher than the rural counterparts. The trend is in agreement with the studies of Singh (1980), Dharmagandhan (1981) and Shukla (1982) but contrary to Torrance (1960), Sharma (1972 and 1974), Mehdi (1973), Azmi (1974) and Mishra (1986). Though the findings of the investigators’ mentioned above were based on a
7.15.5 FINDINGS RELATED TO COMPOSITE CREATIVITY

RURAL SAMPLE
1. The “Rural Experimental Group” and the “Rural Control Group” differ significantly in terms of post treatment Composite Creativity.
2. “There is significant effect of Synectics Model of Teaching Science in terms of fostering Composite Creativity, on Rural Experimental Students”.
3. There is a significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Composite Creativity in Rural students.
4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Composite Creativity in Rural students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Composite Creativity in Rural students.
6. There is significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Composite Creativity in Rural Experimental students.

Discussion

When the Pre-Test and Post-test scores on Composite Creativity were compared the rural experimental group taught through Synectics Model had less t–value (8.4*) over the control group – taught by Conventional Method (17.0*). But the mean score of the experimental group was far higher (119.6) than the control group (99.9). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Composite Creativity. The significant difference shown by the control group was attributable to the curiosity and commitment in some of the subjects, as observed by the investigator.

The finding that Rural Boys and Rural Girls did not differ significantly with reference to Composite Creativity was in agreement with the findings of Hussain and Hussain (1975), Pandey and Pandey (1984), Reddy Sudhakara (1990) and Badrinath and Satyanarayana (1979) and Contrary to Pandey (1981), Ogletre (1971), Passi
(1973), Harison (1973), Singh (1978) and Stimpson (1986). This may be attributed to the similar levels of environmental and pedagogical exposure being shared by them. The investigator noticed that the rural boys and girls were not able to find adequate vocabulary to express their feelings. Their rural dialect hinders their written expressions. Some of the rural girls were able to overcome such hindrances during the treatment. Hence, a higher mean score in rural girls.

**URBAN SAMPLE**

1. The “Urban Experimental Group” and the “Urban Control Group” differ significantly in terms of post treatment Composite Creativity.
2. There is significant effect of Synectics Model of Teaching Science in terms of fostering Composite Creativity, on Urban Experimental Students”.
3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Composite Creativity in Urban students.
4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Composite Creativity in Urban Experimental students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Composite Creativity in Urban Experimental students.
6. There is no significant interaction effect of “Gender”, “Levels of the Students” and “Groups” over the post treatment Composite Creativity in Urban Experimental students.

**Discussion**

When the Pre-Test and Post-test scores on Composite Creativity were compared the urban experimental group taught through Synectics Model had less t-value (6.9*) over the control group – taught by Conventional Method (15.0*). But the mean score of the experimental group was far higher (168.7) than the control group (120.77). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on Composite Creativity. The significant difference shown by the control group was attributable to the curiosity and commitment in some of the subjects, as observed by the investigator.
The finding that Urban Boys and Urban Girls differed significantly with reference to Composite Creativity. The Urban boys had better mean scores than the other sex. This was in agreement with the findings of Strauss and Strauss (1968), Raina (1971), Naintara (1981), Dharmagandhan (1981), Badrinath and Satyanarayana (1979) and Pandey and Pandey (1984) and contrary to Singh (1978), Pandey (1981) and Goel, Tanuja (1990). This was because the urban girls had less freedom of expression than the urban boys. The urban girls could not break their mindset and shed inhibitions totally like boys to make newer imaginations and connections. The urban boys enjoyed more freedom during the treatment than the girls. The urban boys were very bold and quick in suspending the judgment about their trail of thoughts. They were quick in writing as well as thinking aspects.

**RURAL v/s URBAN INTERACTIONS**

1. There is no significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Composite Creativity in Rural and Urban Experimental students.

2. There is a significant interaction effect of “Locality of the School” and “Gender” over the post treatment Composite Creativity in Rural and Urban Experimental students.

3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Composite Creativity in Rural and Urban Experimental students.

4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Gender” over the post treatment Composite Creativity in Rural and Urban Experimental students.

**Discussion**

There is a significant difference between the Rural and Urban students with reference to Composite Creativity. The mean score of urban students was far higher than their rural counterparts. The trend is in agreement with the studies of Singh (1980), Dharmagandhan (1981), Shukla (1982), Girijesh Kumar and Santosh Singh (1999) and Ashok K. Hota (2000) but contrary to Torrance (1960), Aaron et al.
(1969), Sharma (1972 and 1974), Mehdi (1973), Azmi (1974) and Mishra (1986). Though the findings of the investigators’ mentioned above were based on a survey – the existent difference between the localities were comparable with the findings of the present investigator. Finally it was concluded that the difference between cultural groups i.e. Rural and Urban locale students is still at large.

They still differ in their learning styles.

7.15.6 FINDINGS RELATED TO PROBLEM SOLVING ABILITY

RURAL SAMPLE

1. The “Rural Experimental Group” and the “Rural Control Group” did not differ significantly in terms of post treatment Problem Solving Ability.
2. There is significant effect of Synectics Model of Teaching Science in terms of fostering Problem Solving Ability, on Rural Experimental Students.
3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Problem Solving Ability in Rural students.
4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Problem Solving Ability in Rural students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Problem Solving Ability in Rural students.
6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Problem Solving Ability in Rural Experimental students.

Discussion

Even when the Pre-Test and Post-test scores on Problem Solving Ability were compared the rural experimental group taught through Synectics Model had better t-value (5.6*) over the control group – taught by Conventional Method (3.1*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on post Problem Solving Ability.

On the basis of above findings it is concluded that the rural boys and girls did not differ significantly in their post Problem Solving Ability. This is in agreement

Hence, no significant interaction effect was found with reference to moderate variables.

**URBAN SAMPLE**

1. The “Urban Experimental Group” and the “Urban Control Group” do differ significantly in terms of post treatment Problem Solving Ability.
2. There is significant effect of Synectics Model of Teaching Science in terms of fostering Problem Solving Ability, on Urban Experimental Students”.
3. There is a significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Problem Solving Ability in Urban students.
4. There is significant interaction effect of “Gender” and “Groups” over the post treatment Problem Solving Ability in Urban students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Problem Solving Ability in Urban Experimental students.
6. There is no significant interaction effect of “Gender”, “Levels of the Students” and “Groups” on the post treatment Problem Solving Ability in Urban Experimental students.

**Discussion**

Even when the Pre-Test and Post-test scores on Problem Solving Ability were compared the urban experimental group taught through Synectics Model had better t–value (8.5*) over the control group – taught by Conventional Method (3.7*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching on post Problem solving Ability.

On the basis of above findings it is concluded that the urban boys and girls did not differ significantly in their post Problem Solving Ability even in the post test. This is in agreement with the findings of Raina.K (1986) and Hoovinabavi, Kattamani and A.Ediger (2004). But they differed with reference to “Levels” and “Groups”. Hence, a significant interaction effect was found between “Genders and Levels” and “Genders and Groups”. The investigator observed the urban subjects incubating over
the items of the Problem Solving Ability test where in the students of low ability too have improved their performance on the test.

**RURAL v/s URBAN INTERACTIONS**

1. There is significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Problem Solving Ability in Rural and Urban Experimental students.

2. There is a significant interaction effect of “Locality of the School” and “Gender” over the post treatment Problem Solving Ability in Rural and Urban Experimental students.

3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Problem Solving Ability in Rural and Urban Experimental students.

4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Genders” on the post treatment Problem Solving Ability in Rural and Urban Experimental students.

**Discussion**

There is a significant difference between the Rural and Urban students with reference to Post Problem Solving Ability. The mean score of urban students (25.1) was far higher than their rural counterparts (17.9). Further, it may be interpreted that urban experimental students were more susceptible to Synectics Model of Teaching Science than their rural counterparts. Finally it was concluded that the difference between cultural groups i.e. Rural and Urban - Locale students was still at large. They differed in their learning styles.

There is significant difference between the Urban and Rural groups in Problem Solving Ability. They even differed in “Levels”. It may be predicted that the gain in Creative capacity had induced the Problem Solving Ability of the urban experimental students better than the rural experimental students.

There were significant interaction effects “Locality of the Schools” and “Levels of the Students” and “Locality of the School” and “Gender”. This may be predicted due to the significant differences within the “Locality of the Schools –
Rural and Urban” and “Levels of the Students – High, Average and Low Ability students”.

7.15.7 FINDINGS RELATED TO ATTITUDE TOWARDS SCIENCE

RURAL SAMPLE

1. The “Rural Experimental Group” and the “Rural Control Group” do differ significantly in terms of post treatment Attitude towards Science.
2. There is significant effect of Synectics Model of Teaching Science in terms of fostering Attitude towards Science, on Rural Experimental Students”.
3. There is no significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Attitude towards Science in Rural students.
4. There is no significant interaction effect of “Gender” and “Groups” over the post treatment Attitude towards Science in Rural students.
5. There is a significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Attitude towards Science in Rural students.
6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” over the post treatment Attitude towards Science in Rural Experimental students.

Discussion

Even when the Pre-Test and Post-test scores on Attitude towards Science were compared the rural experimental group taught through Synectics Model had better t–value (6.03*) over the control group – taught by Conventional Method (5.5*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching in inducing better Attitude towards Science.

On the basis of above findings it is concluded that the rural boys and girls did not differ significantly in their post Attitude towards Science. But both of them gained in their post Attitude towards science. This finding had concurrency with Lynne E. Houtz (1995) but was contrary to Malviya, Dharma Shila (1991), Srivastava, Veena (1992), Mary Ann Evans, Myrna Whigham and Morgan (1995), Padhi. J.S. (1994) and Maitra, Krishna and Alka (1997). Further the findings of the above investigators was with reference to different contexts and different models of teaching. None of the
study reviewed relates to Synectics. Hence, the above finding is a significant one. A significant interaction effect was found between the “Levels of the Students and Groups”.

Thus, induced Attitude towards science may be attributed to Synectics Model of Teaching Science.

**URBAN SAMPLE**

1. The “Urban Experimental Group” and the “Urban Control Group” differed significantly in terms of post treatment Attitude towards Science.
2. There is a significant effect of Synectics Model of Teaching Science in terms of fostering Attitude towards Science, on Urban Experimental Student.
3. There is a significant interaction effect of “Gender” and “Levels of the Students” over the post treatment Attitude towards Science in Urban students.
4. There is a significant interaction effect of “Gender” and “Groups” over the post treatment Attitude towards Science in Urban students.
5. There is no significant interaction effect of “Levels of the Students” and “Groups” over the post treatment Attitude towards Science in Urban students.
6. There is no significant interaction effect of “Genders”, “Levels of the Students” and “Groups” on the post treatment Attitude towards Science in Urban Experimental students.

**Discussion**

Even when the Pre-Test and Post-test scores on Attitude towards Science were compared the urban experimental group taught through Synectics Model had better t−value (5.15*) over the control group – taught by Conventional Method (2.41*). Hence, it may further be concluded that there is significant effect of Synectics Model of Teaching in inducing better Attitude towards Science.

On the basis of above findings it was concluded that the urban boys and girls did not differ significantly in their post Attitude towards Science. This finding had concurrency with Lynne E. Houtz (1995) and was contrary to Malviya, Dharma Shila (1991), Srivastava, Veena (1992), Mary Ann Evans, Myrna Whigham and Morgan (1995), Padhi. J.S. (1994) and Maitra, Krishna and Alka (1997). Further the findings
of the above investigators was with reference to different contexts and different models of teaching. None of the study reviewed relates to Synectics. Hence, the above finding is a significant one. But they differed with reference to “Levels” and “Groups”. Hence, a significant interaction effect was found between “Genders and Levels” and “Genders and Groups”. Thus, Synectics Model of teaching Science had significant effect in terms of inducing favorable Attitude towards Science.

RURAL v/s URBAN INTERACTIONS

1. There is a significant interaction effect of “Locality of the School” and “Levels of the Students” over the post treatment Attitude towards Science in Rural and Urban Experimental students.

2. There is no significant interaction effect of “Locality of the School” and “Gender” over the post treatment Attitude towards Science in Rural and Urban Experimental students.

3. There is no significant interaction effect of “Levels of the Students” and “Gender” over the post treatment Attitude towards Science in Rural and Urban Experimental students.

4. There is no significant interaction effect of “Locality of the School”, “Levels of the Students” and “Genders” over the post treatment Attitude towards Science in Rural and Urban Experimental students.

Discussion

There is no significant difference between the Urban and Rural groups in their post Attitude towards Science. This finding had concurrency with Lynne E. Houtz (1995), Malviya, Dharma Shila (1991) and was contrary to Srivastava, Veena (1992), Mary Ann Evans, Myrna Whigham and Morgan (1995), Padhi. J.S. (1994) and Maitra, Krishna and Alka (1997). Further the findings of the above investigators was with reference to different contexts and different models of teaching. None of the study reviewed relates to Synectics. Hence, the above finding is a significant one. It may be predicted that the Synectics Model of teaching Science had induced favorable attitude towards science in both of them alike.
7.15.8 FINDINGS RELATED TO DELAYED POST TEST OF RURAL AND URBAN SAMPLES

RURAL SAMPLE

1. There is no significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Fluency – a component of Creativity.

2. There is no significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Flexibility – a component of Creativity.

3. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Originality – a component of Creativity.
   - The Rural Experimental group has lost its gained Originality significantly, because the mean scores of delayed post-test (39.10) is less than the Post-test (40.60). This may be due to Cognitive and Emotional detachment from the treatment session during the post treatment period.

4. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Composite Creativity.
   - The Rural Experimental group could not retain its gained Composite Creativity because the mean scores on Delayed post-test is (115.93) less than that of post-test (119.57). This may be attributed to Cognitive and Emotional detachment from the treatment session during the post treatment period.

5. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Problem Solving Ability
   - The delayed post-test mean (20.73) is higher than the post-test mean (17.93), hence it may be stated that the Rural Experimental group has gained its Problem Solving Ability significantly. This enhancement in
Problem Solving Ability was attributable to incubating tendency of certain subjects in the experimental group.

6. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Rural Experimental group with reference to Attitude towards Science.

➢ The delayed post-test mean (55.37) is higher than the post-test mean (52.27). Thus, it may be stated that the Rural Experimental group has gained its Positive Attitude towards Science. This enhancement in Attitude may be the impact of Synectics through Science teaching.

**Rural Boys v/s Rural Girls**

1. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Fluency – a component of Creativity.

2. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Flexibility – a component of Creativity.

3. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Originality – a component of Creativity.

4. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Composite Creativity.

5. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Problem Solving Ability.

6. There is no significant difference between “Rural Boys” and “Rural Girls” in terms of Delayed Post-test scores with reference to Attitude towards Science.

**Discussion**

Thus on the basis of the above results, it was clear that the Rural Experimental group could sustain the fostered Fluency and Flexibility, but not the fostered Originality and Composite Creativity significantly. This trend emphasized the found belief of Gordon (1971) that Synectics would exert significant influence on
Originality. Moreover, the rural experimental group could enhance its Problem Solving Ability and Attitude towards science. Hence, it may be said that Synectics Model of teaching Science could induce and sustain certain dependent variables in the Rural Experimental group. The rural genders did not differ in sustaining all the fostered dependent variables.

**URBAN SAMPLE**

1. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Fluency – a component of Creativity.

   ➢ The Urban Experimental students have scored better in delayed post test (64.50) than in the post-test (61.97). This shows enhancement in Fluency. This trend is attributable to cognitive and emotional attachment by the Urban students to the Synectics Metaphoric Activity even after withdrawing the treatment.

2. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Flexibility – a component of Creativity.

   ➢ The Urban Experimental students have scored better in delayed post test (36.30) than in the post-test (33.73). This shows enhancement in Flexibility. This trend is attributable to cognitive and emotional attachment by the Urban students to the Synectics Metaphoric Activity even during post – treatment period.

3. There is no significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Originality – a component of Creativity.

4. There is no significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Composite Creativity.
5. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Problem Solving Ability.

- The Urban Experimental students have scored better in delayed post test (29.67) than in the post-test (25.10). Thus enhancement of Problem Solving Ability is manifested. This trend is attributable to cognitive and emotional attachment by the Urban students to the Synectics Method of teaching Science even after withdrawing the treatment.

6. There is a significant difference between the Post-Test scores and the Delayed Post-test scores of the Urban Experimental group with reference to Attitude towards Science.

- The Urban Experimental students have scored better in delayed post test (56.57) than in the post-test (54.80). Thus showing significant gain in Positive Attitude towards Science. This may be due to forging effect of teaching science through Synectics Model.

**Urban Boys v/s Urban Girls**

1. There is a significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Fluency – a component of Creativity.

2. There is a significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Flexibility – a component of Creativity.

3. There is a significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Originality – a component of Creativity.

4. There is a significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Composite Creativity.

5. There is a significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Problem Solving Ability.
6. There is no significant difference between “Urban Boys” and “Urban Girls” in terms of Delayed Post-test scores with reference to Attitude towards Science.

**Discussion**

Thus on the basis of the above results, it was an interesting trend that the Urban Experimental group could sustain the fostered Originality and Composite Creativity. Moreover, the urban experimental group could enhance its fostered Fluency, Flexibility, Problem Solving Ability and Attitude towards science. These findings put up an exemplary trend. Hence, it may be said that Synectics Model of teaching Science could induce and sustain all the dependent variables in the Urban Experimental group. With reference to genders, they did not differ in sustaining the induced Attitude towards science but differed in sustaining the fostered Fluency, Flexibility, Originality, Composite Creativity and Problem Solving Ability.

**RURAL v/s URBAN EXPERIMENTAL SAMPLES**

1. There is a significant difference between the Delayed Post-test scores of the Rural and Urban Experimental groups with reference to Fluency – a component of Creativity.
2. There is a significant difference between the Delayed Post-test scores of the Rural and Urban Experimental groups with reference to Flexibility – a component of Creativity.
3. There is a significant difference between the Delayed Post-test scores of the Rural and Urban Experimental groups with reference to Originality – a component of Creativity.
4. There is a significant difference between the Delayed Post-test scores of the Rural and Urban Experimental groups with reference to Composite Creativity.
5. There is a significant difference between the Delayed Post-test scores of the Rural and Urban Experimental groups with reference to Problem Solving Ability.
6. There is no significant difference between the Delayed Post-test scores of the Rural and Urban Experimental group with reference to Attitude towards Science.

- The Urban Experimental Group has shown its supremacy over Rural experimental group in its delayed post – test scores on all the criterion
variables except that of “Attitude towards Science”, where both of them did not differ much in their mean scores.

**Discussion**

The Rural and Urban experimental groups differed significantly in sustaining the levels of fostered dependent variables – Fluency, Flexibility, Originality, Composite Creativity and Problem Solving Ability but not in induced Attitude towards science. Thus, it may be concluded that the Synectics Model of Teaching Science had differing significant effect on Rural and Urban Experimental Groups.

Further summing up of all the above findings from the delayed post test scores signified that both the experimental groups could sustain majority of dependent variables and even could enhance further.

Thus, it may be finally predicted that Synectics Model of Teaching had significant impact on the experimental groups in fostering and further sustaining – Fluency, Flexibility, Originality, Composite Creativity, Problem Solving Ability and a Favorable Attitude towards Science.

**7.16 EDUCATIONAL IMPLICATIONS AND RECOMMENDATIONS OF THE STUDY**

The following are the educational implications of the present study:

1. The Synectics Model of Teaching Science is found effective both on Rural and Urban samples in fostering Fluency, Flexibility, Originality, Composite creativity, Problem Solving Ability, and Attitude towards Science. Therefore the Synectics model of teaching can be implemented in the Rural and Urban schools simultaneously.

2. The present study also projected that the Synectics Model is more effective on Urban than on Rural experimental sample. Hence, it may be stated that Urban learners are more susceptible to Synectics than the Rural. Synectics Model of presentations may be included into the textbooks with concept specific analogies to inculcate creative potentialities indirectly.

3. It was also found from the present study that Problem Solving Ability and Favorable Attitude towards Science were also developed in both the experimental
groups. Hence, Synectics sessions may be conducted on selected topics in different school subjects like Languages, Mathematics and Social sciences to promote Problem Solving Abilities and favorable attitudes in the respective subjects.

4. **“Permeation Facet of Creativity”:** During the course of Treatment – the students of “Low Ability” preferred to work in a group that had at least a “High Ability” or an “Average Ability” student. Such students have out scored the better ability students in post test and delayed post test. This showed that Low Ability students can be transformed on to better plateaus when associated with better students. This may be called “Permeation Facet of Creativity”. Hence, during Synectics sessions students need not be segregated based on their levels. This trend may also concur the assumption that – **“Creativity is not a function General Mental Ability”**.

5. It was also found that students of average and below average levels can also be fostered in Creativity and its Components, Problem Solving Ability and Attitude towards Science, better than the High Ability students. This trend was specially noticed in Rural experimental sample. Hence, it may be stated that the Synectics Model of Teaching Science helps to improve the above criterion variables irrespective of the levels of the learners. This further signified the quality of Synectics – **“The playfulness of Synectics activities encourages even the most timid participant and it also suits to explore individual differences.”** Consequently the same model of teaching can be implemented with respect to other subjects. Finally it is recommended that special pre-service and in-service training programmes on Synectics may be organized for Rural and Urban teachers, empowering them to promote their students’ creative potentials.

6. Synectics Model was found equally effective both on Rural Girls and Rural Boys. But in the case of Urban Experimental group the boys were superior to girls. In addition Rural girls were inferior to Urban girls in terms of fostered criterion variables. As the treatment is withdrawn, girls appear to have withdrawn their Cognitive and emotional engagement with Synectics. This further signifies that
Girls are succumbing to other factors that deprive them of the fostered Creative abilities. It may be due to certain psycho-social factors influencing in the post treatment period. Such factors need to be explored and spiked in the bud.

7. The investigator observed that the students are highly motivated during stretching exercises. Where “personal” and “Direct Analogies” are introduced as a warm up activity. The students went on suggesting their own new kind of analogies for the next sessions. thus it may be recommended that not only through Synectics Model of teaching alone, the analogies can also be used as scaffolds for motivation thus breaking the monotony of the conventional instruction.

8. “Social Facet”: A carefully selected analogy facilitates incorporating certain “Social Values or Concerns” in to the learners. One such analogy used by the investigator is – “Spread of Cancer with Spread of Militancy (called Naxalism in Rural and Urban areas) in the society”. The investigator could get very mature analogical connections from the students – for Benign and Malignant Cancers as Non-harmful Naxals and Harmful Naxals respectively. Thus incorporating “Social Facet” into the “Synectics – Metaphoric Activity” is possible. Such social facets in the analogies may also benefit the students with decision making abilities consequently leading to problem solving abilities.

9. “Amalgamation Facet”: The metaphoric activity especially “Personal Analogy” facilitates the learner to go on a pleasure tour over his past experiences and amalgamate them with the suggested analogy thus “Suspending Judgment” which is a prerequisite for creative emergence. When a learner is able to suspend his judgment he becomes more balanced decision maker.

10. “Inquisitive Facet”: Synectics Model of Teaching leads the learners to ask many questions regarding the topic so as to acquire enough information to make analogical connections. Hence, a “Synectitian” need to be well versed in the integrative aspects of the topic taught. So it empowers both the teacher and the taught.
11. **Interactive Facet:** During the period of treatment it is also observed that the students are more interactive regarding the topic taught. This was expressed by the subject teachers of the sample schools. They also expressed that some of the cliquey students from the experimental group were also interacting with them about the topic. Thus, Synectics also fosters “Interactive Facet” in the learners.

12. Most of the teachers are aware of use of analogies but neither of its dimensions nor the Synectics Model and even any other Models of teaching. This throws light on the need of including Models of teaching in to the D.Ed., B.Ed., M.Ed., and M.Phil. common curriculum on war foot, especially with reference to Andhra Pradesh State. It is also noticed that models of teaching is included as curricular component in Karnataka, Kerala and other states and also in the four year integrated courses offered by National Council for Education, Research and Training (N.C.E.R.T.).

13. The present teacher educators in the above said institutions of all the South Indian states need special in-service workshops to understand and execute the Models of Teaching.

14. The present study was conducted on rural and urban schools based on specifically defined features. Hence, the results may be generalized to such schools only.

**7.17 SUGGESTIONS FOR FURTHER RESEARCH**

The present study throws following insights on further research on Synectics Model of Teaching.

1. The effectiveness of Synectics can be studied with reference to its Instructional and Nurturant affects both on Rural and Urban samples.
2. Similar kinds of studies can be carried on class X locality specific samples.
3. Comparative studies can be carried with reference to other subjects like Mathematics, Social Sciences and Languages on Rural and Urban samples.
4. Longitudinal studies may be carried year after year with reference to Synectics Model of teaching, to find out the functional relationship between Creativity and problem Solving Ability with reference to learner’s age.
5. The similar research design can be used with alternative tools to see whether Synectics fosters or compels “Incubation – a component of Creativity”.
6. Studies can be carried to find whether “Problem Solving Ability ascends as a function of duration of Synectics treatment.”
7. Studies can be undertaken to develop valid and reliable tools for assessing the subject specific instructional and nurturant effects of Synectics Model of teaching.
8. “Student Level Specific” studies may be conducted to know the effectiveness of Synectics Model on Components of Creativity and Problem Solving Ability.
9. A study on the relative effectiveness of Synectics Model of teaching with any other Model of Teaching can be carried.
10. Integrative aspects of Synectics Model with other Models of Teaching to develop multiple domains of learning may be investigated.
11. Studies to investigate the Socio Economic dimensions, Personality factors etc., affecting Creativity fostered through Synectics could be undertaken.
12. Studies to design training strategies for teacher educators and for teachers in Synectics Model could be taken up.
13. The effect of Synectics Model with respect to “Content Retention” and “Analogy Retention” could be studied.
14. A study to find out the relative effectiveness of Baquer Mehdi’s Verbal and Non-Verbal tests of Creativity may be taken up with reference to Synectics Model of Teaching Science or any school subjects, may be taken up.
15. Class specific and subject specific analogical limitations and their effect on creativity levels of the students when taught through Synectics Model could be taken up.
16. Studies relating to effect of “Training in Synectics Model” on the “Teacher’s Spontaneity in use of Analogies” could be designed.
17. A correlation study on the effect of Synectics model of teaching on subject specific achievement could be taken up.
18. A study on identification of certain psycho – social factors, which influence the Creativity and Problem Solving Ability, can be taken up.
19. A comparative study may be taken up to find the effectiveness of the strategy I and II of the Synectics Model, on the rural and urban samples – with respect to different school subjects.

Thus, the present study concludes with significant educational implications on its findings.