Chapter II

REVIEW OF RELATED LITERATURE
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CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Introduction

It is evident that in creativity, as observed by Stoddard,¹ “We have the essence of what is worth saving and in education we have the means”. Therefore there is an imperative need to reform, in fact revolutionise the whole education. Creative education will have to reach the millions in the class-rooms and in due course this education will transform the very consciousness and ideology throughout society itself.

Knowing and understanding the importance of creativity in education, the present research was carried out in the field of creativity.

It is necessary to review the related literature in the above named field because review of it enables the readers guidelines regarding where they can look for more information. The review also establishes the author's credentials by letting readers know what a researcher is aware of and what has been going on with regard to the current and related topics. A well organised review of literature which is followed by an insightful interpretation is not only of great value to the reader but its preparation greatly helps the research worker to develop his/her own understanding of the field.
The review of each experimental study is delimited on the following four aspects-
- Sample of the study
- Nature of activities in the training programme
- Tools used to evaluate the programme
- Significance of the results

2.2.1 **Training Programmes In Foreign Countries**

Summaries of the experimental studies conducted till 1983 reported by Torrance (1972, 1987)

Some of the important studies are described in detail, while others are briefly mentioned.

Torrance\(^2\) has examined 142 studies till the year 1972 and 146 studies after the year 1972 till the year 1983. He has classified them into nine categories. The first four categories are directly related to different types of training programmes. These are 1) Osborn-Parnes creative problem solving 2) Other disciplined approaches such as training in general Semantics 3) Complex programmes involving packages of materials such as the i) Perdue creativity programme ii) Productive thinking programme iii) Myers and Torrance idea books etc. 4) Complex programmes involving combinations of strategies. The summery of successes in teaching students to think creatively according to the first four categories is given below in Table 2.1.
The summary Of Successes Of The Four Categories Of Training
Programmes Described By Torrance

<table>
<thead>
<tr>
<th>No.</th>
<th>Different types of training programmes</th>
<th>No. of studies</th>
<th>No. of successes</th>
<th>Percent success</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Osborn-Parnes CPS</td>
<td>22</td>
<td>91</td>
<td>91</td>
</tr>
<tr>
<td>2)</td>
<td>Other disciplined CPS procedures</td>
<td>5</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>3)</td>
<td>Complex programmes involving packages</td>
<td>25</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>4)</td>
<td>Complex programmes involving combination of strategies</td>
<td>-</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Different criteria like psychometric tests, Creative products, Creative behaviour are used in all these studies. This has been listed below in Table 2.2

Table 2.2
Different Criteria Used In The Experimental Studies Till 1972

<table>
<thead>
<tr>
<th>No.</th>
<th>Category of criteria</th>
<th>No.</th>
<th>Percent</th>
<th>No.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TTCT (Torrance test)</td>
<td>126</td>
<td>76</td>
<td>29</td>
<td>39</td>
</tr>
<tr>
<td>2.</td>
<td>SOI (Guilford test)</td>
<td>9</td>
<td>5</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>3.</td>
<td>Other tests</td>
<td>38</td>
<td>23</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>4.</td>
<td>Creative products</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>5.</td>
<td>Creative behaviour</td>
<td>14</td>
<td>8</td>
<td>28</td>
<td>37</td>
</tr>
<tr>
<td>6.</td>
<td>Creative self perception attitudes</td>
<td>6</td>
<td>4</td>
<td>21</td>
<td>28</td>
</tr>
</tbody>
</table>
Just like the Creative Studies project and CPS Courses organised by Dr. Parnes at Buffalo University, the Perdue Creativity programme organised by Feldhusen J. F. Treffinger D. J. and Bahlke S. J. (1970) at Purdue University was famous in the field of training in Creativity. Many research projects have been successfully worked out using this programme.

The Purdue Creativity Project was organised by Donald Treffinger S. M. Speedic W. D. Brunner (1974). It consists of two programmes -

1) PCTP ie Purdue Creativity Training Programme by Feldhusen Treffinger and Bahlke (1970) and
2) The productive thinking programme i.e. PTP by Covington, M. V. Crutchfield, R. S. Davies, L. Otton R. M. (1972)

2.2.2 Experimental Study by Bahlke (1967)

Sample: Experimental group of Six Classes of 3rd, 4th and 5th grade (2 Classes each)
Control group of Six comparable classes at the same grade level Programme - Experimental group listened to 28 units of PCTP.

Tests: Creativity tests and school achievement measures.

Results: The performance of experimental group was superior to that control group on verbal originality and language achievement.

2.2.3 Experimental Study by Robinson (1969)

Sample: Sixty six Students of 4th grade from two public elementry schools divided into two equivalent
groups i.e. Experimental group and Control group.

**Programme**: Experimental group listened to two tapes per week and completed the exercise in 14 weeks.

**Tests**: MTCT was used as Pre-test and post-test.

**Results**: Ex. group made highly significant gains on all MTCT scores.

### 2.2.4 Experimental Study by Bahlke (1969)

**Sample**: From a hundred classes of 4th, 5th, and 6th Std. in a school, a sample of forty classes was taken and divided into eight groups each of six classes. Seventy-seven of these groups received training and the 8th group was the control group.

**Programme**: The seven groups received training in some component or combinations of components of PCTP.

**Tests**: MTCT as Pretest and TTCT as post test.

**Results**:

1. The printed exercises were most effective alone or in combination of other components on most of the variables.
2. The stories alone or in combination of other components were quite effective.
3. The presentations were least effective.

### 2.2.5 Experimental Study by Alencar Eunice M. L. Soriano de (1974)

**Sample**: 4th and 5th grade public and private school pupils with two experimental groups and one control.
Programme: One experimental group received PCTP training with the reinforcement of pupil's performance by writing encouraging comments. Second experimental group received PCTP training without reinforcement.

Test: TTCT as pretest post test

Result: 1) Experimental group gained significantly than control group on figural and verbal fluency and flexibility and figural originality.

2) Reinforcing pupils performance did not result in greater gain than the PCTP alone.

2.2.6 The Torrance and Myer's Idea Books (1965) -

R. E. Myers had prepared an experimental training programme in creative thinking which contains a number of exercises. These exercises included materials for activities which involved continuing ideas and elements exploring a variety of possibilities, seeing relationships analysing ideas elaborating ideas and becoming more sensitive and aware of the environment. Excellent results have been obtained by using these programmes. (Torrance 1965).

Torrance himself has carried some experiments in training in creativity. He found a consistent tendency for the trained subjects in all the grades to produce more responses, more flexible responses and more clever responses than the
untrained ones. This difference was statistically significant in all grades except the first and the fifth. In the fifth grade however the difference on flexibility was statistically significant.

2.2.7 Experimental Studies by Joe Khatena (1987)

Joe Khatena has reported 14 experimental studies about the training in creativity in his article in Frontiers of Creativity Research (1987).

He developed a training programme which consisted of 5 strategies, namely breaking away from the obvious and common place, the obvious and common place, restructuring synthesis transportation and analogy with exercises that used both figural and verbal content. He tried this programme with necessary modifications on adults, college students, young children, pre-school, disadvantaged students etc. In general the strategies effectively stimulated the creative imagination to produce original verbal images. He prepared another training programme to encourage the use of creative analogies and images (Khatena 1977) and obtained significant results.

At the end of the review of these fourteen studies Khatena concludes, “In summary this group of studies further supports the view that expressing oneself creatively generally and in original images specifically can be enhanced with training that this applies to young people as well as adults ad that both high and low creatives could benefit from such training.”
Some Discrete Experimental Studies are reported below -

i) Frantz Stever (1975) investigated the effectiveness of three techniques, namely a) Brain-storming b) Synthetics and c) Physionomic response, on 5th grade pupils in two public schools. Subjects were randomly assigned to four groups - three experimental groups related to these techniques each and the control group. Each group met ten times on consecutive school days for a 30 minutes session each. TTCT were used for evaluation.

The factorial analysis found significant effects in all creativity scores. Only partial support was obtained for various hypothesis, according to which

1) Pupils receiving brain-storming instruction did not significantly out score pupils receiving other two techniques on some of the TTCT Scores like verbal and figural total scores.

2) Pupils receiving synectics and physiognomic responses outscored on flexibility and originality and

3) Synectics instructions was found the most successful technique for increasing pupils creative performance.

ii) Miller Jess Harbaugh (1975) At the University of Alabama investigated the effectiveness of training
programme by using C. W. Taylor’s Multiple Talent Approach.

Sixteen students were randomly selected from the third grade students in the international school, Makati, Phillipines. Each lesson of 30 minutes duration consisted of two parts

a) A preliminary brainstorming session about 10 minutes based on specific problems

b) A new problem to which each subject reacted individually. A significant difference was obtained on posttest and pretest scores showing that the training in productive thinking, sub-skills through planned lessons was effective.

iii) Johnson Jerald (1975) at McNeese State University has investigated the effects of specially guided lessons in creative thinking, upon the creative thinking ability, achievement and intelligence of 353 fourth grade students, in ten experiment classrooms and ten control class-rooms TTCT were used for pretest posttest. The book "classroom idea for encouraging, thinking and feeling by Frank E Williams served as a guide in the development of the special guided lessons. Twelve lessons of 30 minutes, specially prepared to stimulate creative thinking, were presented to the ten experimental class-rooms over a 5 month period.
The result of the various analysis indicated a significant F ratio in favour of the experimental groups on a) Total creative thinking b) Flexible thinking and c) Elaborative thinking. The Control group scored significant on the test of fluent thinking. No significant difference was obtained on a) the test of original thinking and b) the test of intelligence and achievement.

iv) Raouf AL ANI from Iraq\textsuperscript{12} (1973) at University of Northern Colorado prepared a training programme to stimulate creative thinking in Science for the junior high school students in Iraq.

v) Moore C. S. J. Sister Mary Eleanor\textsuperscript{13} (1977) at Saint Louis University investigated on the improvement of Student Creativity through theoretical knowledge of creativity while utilizing formal and informal curriculum materials. The programme used instructional materials developed by various psychologists. One hundred and twenty 4th graders participated TTCT was used for post test and pre-test.

Conclusions-
- Creative abilities can be increased by the use of formal and informal materials.
- Teacher background of a theoretical nature does make a difference in a class room performance of the students Lazorowitz R and Huppert Y. (1980) experimented to develop creative thinking skills in secondary school biology students studying in the 10th grade. The experimental
group students showed marked improvement in thinking creatively.

Rouse Ortem and Crutchfield\textsuperscript{14} (1963) used productive thinking problem. The control and Experimental groups were formed which were matched on intelligence achievement and initial scores on creative test. The duration was 8 weeks. The sample was 280 students from 5th and 6th grade. The results were significant and displayed increase in problem solving ability.

vi) In 1967 Ripple and Dancy\textsuperscript{15} used an experimental design. The experimental and control groups were matched on intelligence and creative tests. Ten training lessons were part of the procedure which was administered to the experimental group. The sample was 8th std. students from six different schools. Significant results were obtained on Minnesota test of story telling.

vii) In the same year (1967) Britton\textsuperscript{16} conducted the programme for developing non verbal and verbal creativity for 4 months. The programme was conducted on 4th grade children Minnesota test was used as pre test post test.

viii) In 1967, 69 71 Balhke Feldhusen and Traffinger conducted studies related to verbal and nonverbal creativity. It was 28 weeks programme. The sample consisted of 3rd, 4th, 5th grade pupils. Results were significant only on originality of verbal and non verbal tests.
ix) In 1975 Meichenbaum prepared two types of programmes of creativity -

- self instructions - What person says to himself while solving a problem and
- getting the person to attain to formulate the feelings about it. The sample was highschool students.

The results were significant.

x) In 1977 Goor and Rapport prepared a set of creative games based on creative theories to teach cognitive skills. The sample was 5th and 6th grade pupils. The programme was useful in teaching cognitive skills.

xi) Farrar John Calvin, North Carolina State University - "Effects of training in divergent thinking on learning Mathematics by fourth grade Children.” Ph. D. research.

Objectives- To investigate the effects of direct and indirect teaching approaches on student response to academic instructions in the classroom.

Sample- The subjects were 115 regular classroom students in fourth grade classes in public schools in State Country North Carolina.

Design - Experimental. There were two experimental groups which received the training for creativity, originality and divergent thinking through brainstorming approach to
teaching of Mathematics. Two control groups received traditional convergent thinking approach in Mathematics.

**Tools**

1) Corder creativity originality test  
2) Torrance test of creative thinking  
3) A textbook based Mathematics test.

**Results**

- Post test classroom rating revealed that the experimental group E, had an increase in students initiated responses and did not have any responses initiated by teachers.

- It was not clearly demonstrated that a divergent brainstorming approach to class-room instructions significantly improved performance in an academic subject more than the use of traditional approach.

- It was not clearly demonstrated conclusively that teachers in divergent thinking could enhance performance on measures of creativity.

### 2.4 Some Observations Regarding The Above Mentioned Research

1) Most of the researches are carried out in the field of general creativity.

2) A few researches are carried out in the area of verbal Creativity.

3) Most of the researches are carried out by using a sample
of 1) primary school children 2) junior high school students or 3) College students 4) The samples are small as well as large 5) The obtained results are significant.

2.4.1 The present study aims at promoting Convergent and divergent abilities of Students and also aims at the enhancement of Verbal Creativity of IXth Std. Students.

The following table brings out the Similarities and differences between the present research and the researches mentioned above.

2.5 **Comparison Of Similarities And Differences Between The Present Research And Other Related Researches**

<table>
<thead>
<tr>
<th>No.</th>
<th>Researcher</th>
<th>Similarities</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Parnes &amp; Meadow (1957)</td>
<td>Instructional material on divergent thinking for the development of creativity. Design-Experimental and a control group. Tests based on Guilford divergent thinking pattern</td>
<td>Sample - 17 college students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>iii) Training for general Creativity.</td>
</tr>
<tr>
<td>2)</td>
<td>Parnes &amp; Meadow (1960)</td>
<td>Instructional material on divergent thinking for the development of creativity. Design-Experimental and a control group. Tests based on Guilford divergent thinking pattern</td>
<td>i) Sample - 24 college students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ii) Longterm programme</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>iii) Training for general Creativity</td>
</tr>
<tr>
<td>No.</td>
<td>Researcher</td>
<td>Similarities</td>
<td>Differences</td>
</tr>
<tr>
<td>-----</td>
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<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>3)</td>
<td>Bahlke test</td>
<td>Use of creativity area - verbal creativity language achievement Design - experimental group.</td>
<td>Sample - 3rd, 4th 5th grade children,</td>
</tr>
<tr>
<td>4)</td>
<td>Robinson</td>
<td>Use of creativity test training Design - experimental and control group</td>
<td>Sample - 4th grade students Duration - 14 weeks.</td>
</tr>
<tr>
<td>5)</td>
<td>Alencar Envice &amp; M.L.Soriano-de Fames and Nollar and Reese</td>
<td>Training Design - experimental group ,</td>
<td>Sample - 4th, 5th grade pupil .</td>
</tr>
<tr>
<td>6)</td>
<td>Parnes and Nollar and Reese</td>
<td>Training for development of creative thinking abilities with productive thinking programme,</td>
<td>Sample - school and college students Duration - 2 years.</td>
</tr>
<tr>
<td>7)</td>
<td>Rouse, Otton and Crutchfield (1963)</td>
<td>Training for development of Creative thinking abilities with productive thinking programme.</td>
<td>Sample - 280 college students, 5th,6th grade Training - 8 weeks Test - Minesota test</td>
</tr>
<tr>
<td>8)</td>
<td>Ripple and Dancy (1967)</td>
<td>i) Development of creative thinking ability ii) Training for verbal creativity iii)8th Std. students</td>
<td></td>
</tr>
<tr>
<td>9)</td>
<td>Britton (1967)</td>
<td>Development of creative thinking ability Training for verbal and non verbal creativity</td>
<td>Sample - 4th grade pupils Duration - 4 months Test - Minesota</td>
</tr>
<tr>
<td>No.</td>
<td>Researcher</td>
<td>Similarities</td>
<td>Differences</td>
</tr>
<tr>
<td>-----</td>
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<td>-------------</td>
</tr>
<tr>
<td>10)</td>
<td>Balke Feldhuson Traffinger 1967,69,71</td>
<td>Development of creative thinking ability through training programme</td>
<td>Sample - 3rd, 4th, 5th grade students Duration - 7 months</td>
</tr>
<tr>
<td>11)</td>
<td>Khatena</td>
<td>Design - Solomon group Experimental design training Test - prepared by Khatena</td>
<td>Duration - 2 months</td>
</tr>
<tr>
<td>12)</td>
<td>Traffinger (1971)</td>
<td>Training in creativity Training through stories and exercises</td>
<td>Sample - 4th, 5th, 6th grade children Duration - 14 months</td>
</tr>
<tr>
<td>13)</td>
<td>Khatena &amp; Cickerson</td>
<td>Training in general creativity</td>
<td>Sample - 5 to 10 years children. Test - Torrance test</td>
</tr>
<tr>
<td>14)</td>
<td>Mcichenbaum 1975</td>
<td>Self training self instructional material for problem - solving</td>
<td>Sample - High school students</td>
</tr>
<tr>
<td>15)</td>
<td>Goor and Rapport</td>
<td>Preparation of material based on theories of creativity. Material was used to teach cognitive skills</td>
<td>Sample - 5th, 6th grade children</td>
</tr>
</tbody>
</table>

### 2.6 Training Programmes In India -

After having reviewed the research related to training in creativity in foreign countries the researches concerning training in creativity are reviewed here. In last 25 years, the total number of researches is around 200 researches only. The most researches are conducted in the area of general creativity.
Mostly the areas are teacher education, test and measurement, personality traits, comparative studies.

Following are some of the related researches, which are undertaken in the field of creativity in India.


**Sample:** Students of VIII Std.

**Subject:** Geography

**Test:** PTCT

**Findings:**

i) Creative teaching method did not produce differential effect upon general creative thinking and upon creative thinking in Geography too.

ii) Experimental group produced higher mean performance on achievement in Geography.

2.6.2 Deshmukh M.N. (1979) - An analytical study of some scholastic conditions and practices as contributory factors to creative ability.

In the context of the education system emphasizing convergent thinking by classroom instructions the Study was designed to find out experimentally if appropriate manipulation of teaching learning process could promote creativity.

**Procedure** - The procedure consisted of surveying the existing class-room process for conditions to develop
creative ability of pupils and conducting an experiment to investigate the efficiency of role playing and brainstorming technique in the development of creativity.

Sample - Fifty one teachers who taught Marathi and social sciences were randomly selected from 94 secondary schools in Nagpur city. The sample for the experiment consisted of 114 boys and 30 girls studying in randomly selected three sections of Class VIII in one of the twenty schools involved in the survey. The tools used in the study were Dennys class-room creativity observation schedule (CCOS) group test of intelligence (Khanapurkar), socio economic status scale (Kuppuswami), Torrance test of creative thinking (TTCT) Minnesota creative ability check-list and students reaction schedule prepared by the investigator. For the survey the teaching of each of the five teachers was observed at least twice on CCOS. For the experiment the investigator taught the experimental group A by role playing technique and group B by brainstorming technique. The control group C were not given any treatment. Group A was taught Marathi for 30 class periods, and to group B, Social Science for an equal number of periods. Attempt was made to create conditions for physical and instructional openness, removal of blockages to creative development, freedom of expression, psychological safety, minimum of training and group constraints and maximum students participation and initiation responsive motivational climate for extended effort, while differing judgement and encouragement to divergent thinking and appreciation of unusual ideas during the experimental teaching Multifactor
co-variable design was employed for the comparison of groups on post test scores on various creative and scholastic achievement variables. The 't' test was used to find out sex differences in creativity relationships between intelligence and creativity was calculated by product-moment correlation.

The major findings were—

I. The classroom teaching was found to be very low in motivation student involvement and peer interaction. It was primarily convergent in nature.

II. Teaching through a role playing and brainstorming was characterised by high positive motivation, pupil involvement positive peer interaction and encouragement to unusual responses.

III. Brainstorming was found to be more interesting and effective in establishing teacher – pupil rapport in encouraging universal responses than teaching through role playing.

IV. Gain in creativity of brainstorming group and the losses of the role playing group there irrespective of the level of the interest.

V. In the role playing group low creativity students gained on all verbal creativity factors, figural originality and comprehensive score for creativity.

VI. Generally girls performed better than boys on creativity measures indicating significant sex differences in creativity.
VII There was moderate positive response between creativity and intellect for various creativity factors.


Sample - Four groups of students from Std. VIII. 4 student teachers 4x4 Latin Square design

Duration of training - 14 weeks

Data collection was done by using an intelligence test, creative thinking test, and an achievement test.

Data analysis - Analysis of variance and test of significance difference were used.

Findings - Major differences between the 4 selected strategies in development of creative thinking and achievement in science at 0.01 level.

i) The four strategies of teaching had significantly differential effects on the development of originality and flexibility of Std. VII pupils but not C in case of fluency.

iii) Strategy ie. lecturing with discussion, practical work use of audio visual aids produced significantly higher mean scores for the achievement of the pupils than all other strategies.

iv) The strategy was more effective in developing creative thinking and its components than the all other strategies.
v) The effect of strategies were dependent upon the level of intelligence, sex and creativeness of the pupils.

vi) Dominance of practical work did not show any significant superiority over lecture with respect to low intelligence and low creativeness.

vii) The results highlighted the importance of maximum use of audio visual aids in class-room teaching for the enhancement of creative thinking.

2.6.4 Nirpharake A - Training in creative appreciation Ph.D. Edu Poona Uni. 1980 The purpose of the experiment to develop and try out training programme.

Pre test - Post test design, 12 days - Class VII divided into 2 matched groups coming from different schools middle class urban background with superior level of intelligence and normal level of initial level of creativity formed the sample in experiment and control groups.

The Tools - Ravin Ltd. progressive Matrices Kadokar’s group test of general mental ability and Torrance test of creative thinking verbal form A. The independent variable was training in creative appreciation periods - 25 school periods of 35 minutes.

This was the treatment which included especially selected tasks. The dependant variable was creativity as measured by sample.

Findings -

i) The experimental group showed marked
improvement in all the aspects of creativity after receiving training over the control group as well as over its own pre test scores. The control group did not show any significant improvement on its pretest scores.

ii) Training in creativity appreciation was especially effective educationally because it could be adopted to various classroom situations by teachers of languages and fine arts without having to marshal any extra techniques of creative teaching.

2.4.5 Jariai G. S. - Instructional material for developing creativity in students, Ph.D. Edu. Indore University 1981

The main objectives of the study were

i) To prepare verbal and non-verbal instructional materials.

ii) To assess the effectiveness of verbal and non-verbal instructional materials in the development of creativity of students.

iii) To compare the gains of male and female students in creativity after treating them with verbal and non-verbal instructional materials

The sample consisted of 160 class IX students divided into two groups - Controlled and Experimental.

Findings - The post test creativity mean scores of students of verbal and non-verbal experimental groups were significantly higher than those of the students of the verbal and non-verbal Control groups.
2.6.6 **Mohammod Miyan** - A study to examine the effectiveness of methods of teaching mathematics in developing mathematical creativity JML 1982.

**Sample** - Students of Std. IX Kendriya Vidyalaya New Dehli.

**Test** - Test of mathematical Creativity developed by the investigator.

**Findings** - Tell and do guided discovery and pure discovery were not significantly different in developing creativity.


The major objectives of the study was to find out whether creative methods of teaching Physics and Chemistry were superior to the traditional methods in attaining higher objectives.

The parallel group experimental design was used

**Findings** - The creative methods were superior to the traditional methods like verbal illustration and demonstration in attaining higher objectives in science.


The objectives of the study were

- To identify the creative and non creative students
- To prepare problem solving tasks and
- To find out the difference in problem solving ability between the creative and non creative students.
A set of tests involving problem solving ability was developed for the purpose. The sample for the study consisted of 200 students from 2 Secondary schools of Patna for identification of creativity and non creativity students. The creativity test of Mehdi was used. The two groups of creative and non creative students were tested on problem solving tasks. In order to avoid experimental errors, all the students were subjected to task performance in the same conditions.

**Findings** -

1) The creative and non creative students differed significantly in their problem solving ability. There was thus need for designing more tasks to the creative students after they were identified. The assignment of problem solving in secondary schools should be in accordance with the degree of creativity. Further the findings was much use to curriculum planners and scientific creativity in the sense that the same problem or the same set of problem in Science could not work gainfully with all the students in the classroom.

2.7.9 Vora Gira C - An investigation into the impact of divergent thinking problems in mathematics on creativity levels of the children of classes VII & VIII Ph.D. Edu. SPV 1984

**Objectves** -

- to provide a reliable divergent thinking programme in Mathematics
- To study the effect of divergent thinking programme in mathematics on creativity of the students of VII
and VII Std. with respect to reinforcement feedback

- To study the effect of a divergent thinking programme in mathematics on the creativity components viz - fluency, flexibility and originality.

- To investigate whether there were grade differences in the Creativity and

- To invent whether there were sex difference in creativity.

The researcher constructed the DTP consisting of these type of programmes namely

i) Multipurpose type a) Algebra and b) Geometry and

ii) Make up problems tyhe a) Algebra b) Arithmetic

The programme was tried out on a sample of 115 Students of whom 52 students were from class VII and 63 were from class VIII. The other tool was used for connecting the data was Passsi’s test of creativity. In order to study the effect of the DTP (DTPM) 271 students were selected - 130 students of grade VII and 141 students of grade VIII. The 3x2x2 factorial design was used and analysis of co-variance was used for drawing conclusions.

Findings -

i) The Creativity increased as a result of treatment of the DTP in Mathematics with and without feedback at both grades.
ii) The DTP in Mathematics was equally effective in both groups, boys and girls, the experimental group proved superior in the components of creativity. Namely fluency and originality after taking the DTPM than the other group. There was significant increase in the scores of the 1st group of students who were given feedback on the component of fluency of creativity.

iii) There was no significant graded differences in creative scores measured on the post test.

iv) There was no significant difference between the means of both sexes even after taking the DTPM

v) The programme worked well for both high creativity and low creativity standards.

vi) The opinions regarding the DTPM given the by the standards of the classes were quite favourable and encouraging.


The study aimed at investigating the efficiency of two creativity technique viz - Bionics and Morphological analysis conductive to develop some personality correlates of scientific creativity. The personality variables were - i) self-reliance ii) dominance iii) emotional iv) venturesome v) superego strength.

The sample for the study consisted of 250 students learning in class IX in five sections of 2 different schools in Nagpur
city. Three groups of students were matched initially on intelligence and creativity variables. Allotment of training to these three groups was done randomly. In order to teach science using Bionics and Morphological analysis topics from science subjects suitable for these techniques from the syllabus of class IX were selected. Two periods per week were alloted for the experiment. The experiment was carried out for one academic session. Personal profile approach was employed for pre post test experiment design. Forms A & B of the Indian adaption of H.S.P.Q. (1969) were used as pre post test.

Findings -

i) The Bionics group had shown positive gains on 4 variables ie. emotions, dominance superego strength and self-reliance and negative gains are variable - venturesome

ii) The Morphological analysis had positive gains on three variables ie. - dominance superego, strength and venturesome and gains on 2 variables- emotions and self reliance.

iii) The control group had shown general decline on all the five variables.

iv) The comparison of difference in mean gain of Bionics and morphological analysis had shown that the gains on the three variables - emotion, dominance, self-reliance were more in the Bionics group where as the gains on supergo strength and venturesome were more in the morphological
analysis group. However some of the gains were statistically significant.


The objectives of the Study were
- to provide standard creative thinking programme in Gujarati for elementary school children.
- to study the effect of the programme on the creative level of the children.
- to study the effect of the programme on the creativity components viz - fluency, flexibility, originality.
- to verify whether the main effect of the IQ was significant.
- to investigate the main effect of sex and
- to study whether there exists any interaction effect on the creativity and its component measures.

The eight classes of different schools - Selected from Kheda district were equated on the basis of the scores made by the students on creative ability of test prepared and standardised by J.Z. Patel. The CTP was translated in Gujarati out of 32 programmes 18 were translated into Gujarati. Seven other similar programmes were prepared by the investigator. The programme prepared by J. Z. Patel was also administered to students of eight classes. Out of
eight classes, four were treated as experimental classes where the programme were implemented. The remaining four classes were treated as control classes. The 2x2x2 factorial design was used (Tr. x IQ x sex ) and the analysis of variance was used to analyse the results.

Findings -

i) The main effect of training given to the experimental group was significant for creativity and its 2 components measures viz - fluency, originality.

ii) The research confirmed the effectiveness of creative thinking training in the Indian setting. In spite of big classes rigid classroom, control memorization and respect for teachers in comparison with American classes, the gain in creativity was positive.

iii) The main effect of IQ was significant but sex factor was not significant. The minimum IQ suggested by Torrance and by Raina was 120. This statement was supported by the findings of this study that IQ played an important role in the development of creativity in a child. There was no significant interaction effect on creativity and its components.

iv) The Creativity training programme could be practically imparted to the children in the developing country like India.

2.6.12 Ryvan Michael S. J. - Preparing and trying out the programme for developing Creative thinking ability in the students of the Age group between 10 + 12 controlling some psycho-social factors, Ph.D. Edu. SPV 1988.
The objective -

- To prepare a project for developing of creativity technique Ab (CTA) in Stds. of grade V VI VII.
- To construct a non verbal CTA test measuring entrance and criterion (CTA) behaviour of students of grades V VI VII.
- To construct a verbal CTA test measuring entrance and criterion CTA behaviour of students of grades V, VI, VII and
- To study the effectiveness of the CTA development programme on the students of grade V, VI, VII

The investigator constructed verbal and non verbal CTA criterion test other tools used for connecting the data were anxiety scale parental behavioural scale, self done activities scale, happy go lucky scale & IQ emotional stability scale, nemoticism scale.

The investigator also prepared a non-verbal and verbal programme for developing creative thinking ability. The experiment was carried out on students of grades V, VI, VII of three schools out of which one school was treated as control school. The sample included 330 students. Analysis of co-variance was used to control the effect of intervening Variables.

Findings -

i) The experimental groups gained by the CTA programme more than the control group which did not receive any treatment.
ii) The adjusted means of the 2 experimental groups did not differ from each other whereas the means of the control group was found significantly lower than the means of the experimental group.

iii) The CTA treatment was found to be effective when the different variables like anxiety, parental behaviour, self-done act schedule achievements, self-sufficiency, emotional stability were controlled.


The study was designed

i) to evolve a suitable teaching strategy which would be useful for teaching Mathematics in creative manner in Indian schools and

ii) to use a social structure & personality approach to analyse the interaction characteristics of a person and the children of the social setting as they influenced creativity.

The sample consisted of 277 (165 urban and 112 rural) male students of classes VII and VIII selected from 2 intermediate colleges of Sultanpur district. Teachers were trained to teach Mathematics through the use of specially designed teaching strategy. Mathematics creativity test and general creativity test by Bagner Medhi were used before and after the
treatment. Hindi adaptation of Thomdike Dimensions of temperament test and Biographical Inventory by B. Medhi were administered to collect personality and biographical data.

Findings-

i) The special design technique strategy had a significant effect on the creativity.

ii) The same method of teaching could not be used effectively at all levels of mental development.

iii) The high and low general creatives did not significantly differ with respect to 10 personality factors measured by Thorndikes Dimension of temperament.

iv) The high and low general creatives differed significantly with respect to socio-cultural and educational background attitude and level of aspiration.

V) When high and low creatives differed significantly with respect to three personality factors viz. cheerful, placid and impulsive.


Objectives-

- To develop a CTP for VI grade children
- To study the effects of creativity training programme upon the development of verbal fluency, verbal
flexibility, verbal originality. Composite verbal creativity, non verbal originality, non verbal elaboration and composite non verbal creativity of VI grade children separately.

- To study the interaction effect of CTP and level of Intelligence on the development verbal fluency, verbal flexibility, verbal originality, composite verbal creativity, non verbal originality, composite verbal creativity, non-verbal originality, non verbal elaboration and Composite non verbal creativity of VI grade children separately.

- To study the effect of CTP on sex on the development of verbal flexibility, verbal originality, composite verbal originality, non verbal elaboration and composite non verbal creativity of VI grade children separately.

- To study the interaction effect on level of Intelligence and sex with CTP on the development of verbal fluency, verbal flexibility verbal originality, composite verbal creativity, non verbal originality, composite non verbal elaboration and composite non verbal creativity of VI grade children

- To find out the reactions of the students towards the creativity training programme.

The hypothesis were -

1) There is no significant difference in the mean gain Scores of verbal fluency, verbal originality, verbal flexibility, composite verbal creativity non verbal
originality, non verbal elaboration and composite non verbal creativity, separately between the students of the treatment group who are given training through CTP and the students of the non treatment group who did not get such training.

2) There is no significant interaction of the level of intelligence and sex within CTP on the development of verbal fluency, verbal originality, composite verbal creativity, non verbal originality, non verbal elaboration and composite non verbal creativity.

The Sample Comprised of 367 students (188 girls 169 boys) from govt. schools. The 2 x 3 x 2 factorial design was employed. The independent variables were treatment conditions (Training through CTP and no training) intelligence (high and low) and sex Jalata’s group test of general Mental ability was used to measure intelligence B Medhi’s test of creative thinking (verbal and non verbal) were used to measure verbal and non verbal creativity CTP was developed by the Investigator. A CTP questionnaire was used to find out the opinion the students concerning the CTP. The data were processed with the help of analysis of variance.

Findings -

i) The CTP was successful in development of creative thinking abilities, both verbal and non verbal among students.

ii) As far as the interaction of the level of intelligence with CTP on the development of various components
of verbal and non-verbal creativity was concerned
the findings of the study did not indicate any
significant interaction between intelligence level and
CTP except for verbal originality.

iii) The CTP was equally effective for both male and
female students.

iv) No significant interaction was formed among the
level of intelligence, sex and CTP for any of the
components of creativity. The majority of the
students felt that they had improved their creative
thinking skills.

2.6.15 Nandan Pawar B. S. - Development of linguistic creativity
among the students - An experimental study Ph.D. Edu.
Nag V. 1986.

The hypothesis which formed the basis of the study were
i) Teaching through a creative method improves
Marathi language proficiency of students

ii) Teaching through a creative method develops
linguistic creativity among students.

iii) Teaching through a creative method develops such
abilities as involved in linguistic creativity as
vocabulary sentence construction, poem composition,
story writing and imagination among the students.

The sample for the study consisted of ninth class students
offering Marathi as mother tongue. Two equivalent groups
were formed on the basis of a test in Marathi.
Experimental and control training were randomly assigned
to these two groups. A suitable adaptation of a test of
literary creativity in Marathi, developed by M. B. Kundley was administered to the 10 groups as pre test. The experimental group was taught Marathi through a creative method developed by the investigator and the control group was taught through a traditional method throughout the session. The two groups were post tested on the different items of the same test. ‘t-test’ was employed for comparison of the two groups on the gain scores.

It was found that the experimental group scored significantly higher than the control group i) Language proficiency ii) Overall creativity iii) All the abilities involved in linguistic creativity.

2.6.16 Bhagwat S.(1997)- Preparation of a package of divergent production type problems in Mathematics and to study the effectiveness of the package against the sex difference and the level of intelligence for Std. VIII students in Pune City.

Objectives - The researcher prepared a package containing divergent type problems related to VIII Std. Mathematics syllabus. One of the objective was to test the effectiveness of the package against the levels of Intelligence for VIII Std students. The second objective was to test its effectiveness against sex difference Tools - 1) Standard test of measurement of creativity 2) A divergent thinking test prepared by the researcher 3) Raven’s progressive Matrics Intelligence test. The sample was 120 students of Std. VIII of Pune City.
Training was based on S. I. Model by Guilford. Duration of training was one month.
The ‘t’ test and Anacova technique were used.

Conclusions- The difference between pre and post test was highly significant. 2) The package was effective irrespective of intelligence levels. 3) The package was equally effective for low scorers and high scorers. 4) Sex difference was observed in promoting divergent thinking ability in Maths. The girls differ significantly than boys.

2.6.17 Gujrathi N. M.- Preparation of an integrated programme of training in scientific creativity and experimental study of its effects on students of 9th grade.
Sample- The students of 9th Std. from English medium school were selected. The total number was 60. The training programme in scientific creativity included practical work like - 1) Open-ended experiments ii) Science projects iii) Preparation of creative toys.

The pretest post design was implemented. The SCT test was prepared by the researcher. The training period was three months. In both the pilot and experimental study the gains of the ex. group on MSCT and SCT were highly significant.

Above described researches are compared with the present study down below.
2.6 **Similarities And Differences** -

<table>
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<tr>
<th>No.</th>
<th>Researcher</th>
<th>Similarities</th>
<th>Differences</th>
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</table>
| 1)  | Pillay G. S. (1978)   | Sample - VII Std students  
Subject - Geography  
Method - training       | Test - PTCT                                                               |
| 2)  | Deshmukh M. N. (1979) | Experimental design  
use of 't' test  
Method - training       | Sample - students  
2 teachers  
Techniques - role playing Brainstorming |
design - experimental  
Method - training       | Sample = VII Std student - teachers            |
| 4)  | Nirpharake (1980)     | Design - pre-test  
post test  
Training period - 25 school periods | Sample - boys in VII Std A small sample  
Tools = TTCT test  
Ravin’s Std progressive metrics test  
khothurkar’s group test |
| 5)  | Jarial G. S. (1981)   | Preparation of verbal and non instructional material to develop Creativity by the researcher  
Sample - large  
Pre test post test design       | Sample - boys and girls  
sex difference as one of the variable            |
| 6)  | Mohammad Miyan (1982) | Sample - IX Std. students  
Test -developed by the instructor  
Subject - Maths       | Discovery method |

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<td>7)</td>
<td>Nair P.N.G. (1978)</td>
<td>Design - experimental</td>
<td>Subject - Science</td>
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<td>Subject - Science</td>
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<td>Test - developed by the researcher</td>
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<td>Subject - Science</td>
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<td>10)</td>
<td>Yawalkar V. (1985)</td>
<td>Sample - large IX Std students experimental design</td>
<td>Design - personality co-rrelates</td>
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<td>12)</td>
<td>V.Ryan Michael S.J.</td>
<td>Preparation of verbal programme in development of Creative thinking</td>
<td>Sample - V, VI, VII pupils</td>
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<td></td>
<td>by the researcher</td>
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<td>Creativity test -prepared by the researcher</td>
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<td>13)</td>
<td>Singh B. D. (1985)</td>
<td>Sample - large training</td>
<td>Sample - VII, VIII Std students</td>
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<td></td>
<td></td>
<td>Subject - Maths</td>
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<td>14)</td>
<td>Gupta P.K. (1985)</td>
<td>Devp. of Creativity training programme verbal Creativity</td>
<td>Sample - VI Std pupils both sexes</td>
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<td></td>
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<td>Design - exp. and 1 control group</td>
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<td>No.</td>
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<td>15)</td>
<td>Nandan Pawar B.S.</td>
<td>Sample - IX Std Stu Dr. M.B. Kundale’s Creativity test Pre test post test experimental design</td>
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<td>16)</td>
<td>Bhagwat S.</td>
<td>Preparation of a test of divergent production ‘t’ test Content - syllabus based</td>
<td>Sample - VII Std students boys &amp; girls Subject - Maths</td>
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<td>17)</td>
<td>Bhaskara (1987)</td>
<td>Preparation of verbal Creativity instructional materials prepared by the researcher</td>
<td>Sample - 6th grade children Duration -13 weeks Passis test of creativity</td>
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<td>18)</td>
<td>Gujrathi N.M.(1992)</td>
<td>Sample - IX Std students Training instructional material prepared by the researcher training in scientific creativity</td>
<td>Sample - small</td>
</tr>
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2.7 **Analysis Of The Findings Of The Above Mentioned Researches**

1) It is observed that the number of programmes in the field of training in creativity is comparatively small.

2) Most of the training programmes are in the area of general creativity,
3) Many of the programmes combined more than two techniques while training the students.

4) The number of training programmes in the area of verbal creativity is small.

5) More studies were conducted in the area of divergent production.

6) More studies were conducted in the subjects like Mathematics and Science, the field of languages was a neglected area.

2.8 **Direction Of The Present Study**

The above related researches showed that there is a lot of scope to conduct training programmes. The field of verbal creativity is not tapped fully.

The present study aims at promotion of Convergent and divergent abilities. Both the abilities are needed for the development of a child. If a right kind of training is imparted in the school, it will be beneficial for the all round development of the Students.

With these views in mind the present research was undertaken.
1) Stoddard

2) Torrance E.P.

3) Parnes

4) Feld Husen J.F, Treffinger D. J and Bahlke S. J.

5) Covington M. V, Crutchfield, R. S. Davies, L. Otton R. M.

6) Robinson
7) Alencar E, M.L. Sorrianoode
Cited in the Dissertation Abstracts International 35 (6).

8) Joe Khatena
"Developmental patterns in training children between the age of 5 to 11 to think creativity with pictures" Educational Trends, 1973.

9) Goor and Rapport

10) Frantz Stever

11) Miller Tess Harpaugh

12) Johnson Jerald
Cited in the dissertation abstracts international.

13) Raouf AL ANI

14) Moor C. S. J. Sister Mary Elenor
15) Ortem and Cruchfield R.S

16) Ripple and Dancy J.
   The facilitation of problem solving and verbal creativity by exposure to programmed Instructions' Psychology in school.

17) Briton R. J.

    Survey of Research in Education. Buch M.B. Ed. (1979) : III
    Survey of Research in Education. Buch M.B. Ed. (1979) : IV

19) Gujrathi N.
   Preparation of an Integrated programme of training in scientific creativity and experimental study of its effects of students of 9th grade, Ph. D. Edn. Thesis submitted to the S.N.D.T. University, Bombay.

20) Bhagwat S. :
   Preparation of a package of divergent production type problems in mathematics and to study the effectiveness of the package against the sex difference and the level of intelligence for std. VIII students in Pune City - Ph. D. Thesis submitted to the S.N.D.T. University, Mumbai.
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