Chapter - II
REVIEW OF RELATED LITERATURE

Introduction

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2.1 Introduction

A summary of the writings of recognized authorities and of previous research provides evidence that the investigator is familiar with what is already known and what is still unknown and untested. The significance of such review of related literature is clearly pointed out by Borg (1965) who observed that "literature forms the foundation upon which all the future work is built". Review eliminates the duplication of what has been done and provides helpful suggestions for significant investigation. According to J.W. Best (1977) a fabularity with the literature in an problem area helps the research to discover what is already known, what others have attempted to find out, what method attacks have been promising and what problems remain to be solve.

The investigator has reviewed the reports of previous researchers, dissertations, articles, surveys, reports, books and internet sources. The findings, opinions, and statement of various researchers and authors which have a bearing on the present study are presented in this chapter.

2.2 Methods Used for Developing Creativity

Many studies have been conducted all over the world to try out different methods for developing creativity. These include teaching programmes, teaching methods and instructional material.

programmed instructional booklets in which children were taught to become better problem solvers through the presentation of a number of detective problems solvers through the presentation of a number of detective problems and by utilizing several 'guide-posts' for effective thinking. The meta-analysis of findings of different researchers done by Rose and Lin (1984) showed the significant effect of these programmes on figural fluency and originality of Torrance Test of Creative Thinking.

Another method that attracted the attention of researchers was Procedures Thinking Programme. The main feature of this programme was to foster divergent thinking ability of verbal and figural fluency, flexibility, originality and elaboration among primary school children. This method consists of 28 audio tapes, each accompanying printed exercises. These programme were studied by Bahlke (1967), Feldhusen et.al. (1971), Speedie et.al. (1971), Sharief (1978), Huber et.al. (1979), Haweb (1985 a,b), Patel (1987), etc. Most of the researchers reported the significant effect of these programmes on creative ability of IV, V and VI grade students. The researchers further found that even the emotionally disturbed children could be trained to think in a more creative fashion by using these programmes. Meta-analysis of these programmes (Rose and Lin, 1984) showed its greatest effect on figural fluency and flexibility of Torrance Test of Creative Thinking. All these were materials. Teaching programmes that carried audio, visual as well as printed materials. The students of various grade levels were exposed to these programmes according to fixed time intervals for various sets of instructional materials.

There are other types of researchers that developed their instructional material and workbooks also designed for the development of creative thinking and writing. Mayers and Torrance (1964, 1965a, b, 1966b, 1968) have developed idea books in order to foster creativity among elementary school children. Many researchers like Casey (1964), Britton (1967), Freiheit (1969), Woodifee (1970), Cherry (1973) tried these workbooks and found them
effective for improving verbal divergent thinking scores, especially when teachers were guided in the use of workbooks, different researchers done by Rose and Lin (1984) showed the significant effect of these programmes on figural fluency and originally of Torrance Test of Creative Thinking.

Similarly, Renzuli (1973 a, b) and Renzuli and Callahan (1973) designed a series of publication named as “New Direction in Creativity” which consisted of a number of exercises to foster the divergent thinking. Callahan and Ranzuli (1977) reported evidence supporting the programme's effectiveness, based on a study of more than 600 sixth grade students from 22 rural, suburban and urban schools.

Almost all these researchers found that teaching programmes or learning material developed by them was effective in developing creative ability among their subjects. Apart from the reasons given by these researchers, one most prominent reason that seems to be affecting creativity was the specific teaching learning environment that was created by their teaching.

There are many other researchers who worked in different types of media, modules, silent films, etc., for the development of creativity and found the effectively of these on divergent thinking. They were Cunnigton and Torrance (1965), Sharpies (1967), Furness (1968), Feldhusen et. Al. (1969), Luthe (1976), Rodge (1976), Badhure (1978), Ponnuswani (1980), Shah (1981) and Sharma (1986). On the basis of his study, Sharpies (1967) and Furness (1968) concluded that successful employment of stimuli did not depend upon their inherent quality but upon the teaching climate within which they were presented and upon the teacher who carried the atmosphere for imaginative responses.

Many researchers tired creative solving approach developed by Parnes and his associates to find out the improvement in creativity. The most
pertinent are Parens (1959), Parnes and Meadwos (1959), Parnes and Meadows (1960), Reese and Parnes (1970), Renners and Renners (1971), Noller and Parnes (1972), Parnes and Noller (1972, 1973), Biles (1976), Reese et. al. (1976), Kealey (1977), Noller and Biondi (1977) and Shean (1977). They found that creative problem solving helped in fact finding, problem finding, solution finding and acceptance. These researchers found the significant effect of training on all measures of creativity i.e. fluency, flexibility, originality, elaboration and sensitivity.

Another most widely used technique had been Brain Storing. Meadow et. al. (1959), Parnes and Meadow (1959) and Turner and Reins (1965) found brain storming technique most effective for improving the creative thinking of the individual in Parnes programmes. In Indian set up, Chatterjee and Mitra (1976), Deshmukh (1978), Piaget (1978), Patel (1988) and Rao (1988) tried to show the effectiveness of brain storming.

Krishna Murthy (1967) took up a study to find out the effectiveness of the first strategy ('making familiar strange') of Synectics model through teaching of physics in developing creative thinking ability. 40 students of a section of VIII grade of a school formed the sample. Pre-test, post-test experimental design was followed. It was found that there was a significant increase in fluency, flexibility and originality components of creativity. It was equally effective for both boys and girls.

Smith (1971) conducted a study to see the effect of reading related writing tasks in relation to short stories to promote creative thinking and showed no effect on the written products of the students.

Royer and Cable (1976) found that analogies were only employed when the target was difficult to understand i.e. when student felt that it was necessary to look for analogies as an aid to understanding.
Khatena Joe (1977) reports that through a special training programme, the experimental group was taught to use simile, metaphor, personification and allusion as comparison forms within the four analogy classifications, viz., Direct Personal, Symbolic and Fantasy analogy to differentiate between simple and complex images in the production of analogies. Generally high and low creative experimental obtained significant originality scores than high and low creative controls, experimental and controls preferred to use direct analogy, simple image patterns to other analogy-image forms; and high creative’s of both groups produced more complex images than the low creative’s of both the groups and only one symbolic analogy and a few fantasy analogies were produced by both the groups with experimental producing more fantasy analogies than the controls. Although the training did not serve the function of significantly increasing the use of personal, fantasy and symbolic analogies.

Nirpharake (1977) designed a study to develop an integrated programme of creativity training based upon the four vital areas of creativity - training in cognition or perception, training evaluation and appreciation as well as training in creative problem solving. Using Torrance Test of Creative Thinking as the criterion measure, it was observed that all the four strategies as well as their combinations have been proved significantly effective in developing student’s scores on the criterion test.

Enyeart (1979) for instance, found no general correlation between analogy use and Paigetian levels. There was only a significant correlation between the use of formal analogies (i.e. analogies representing proportions) and formal operation thought. Gabel and Sherwood (1980) reported a tendency for their analogies to be more effective for students of lower formal reasoning ability and not especially useful for more capable students.

Prasad (1979) and Mohammad (1989) conduct study to find out the effect of discovery method of teaching on creative thinking abilities of
students. Using the Mehdi’s test of verbal creativity as the criterion measure, it was observed that the discovery method of teaching proved significantly effective in developing fluency, flexibility and originality dimensions of creativity.

In all the technique or teaching programmes reviewed above, there had been some basic characteristics like free expression of imagination, group activity, evocative sessions. But the basic problem with these had been that these cannot be made a part of the school teaching programme. Reason being that these programmes or techniques can only supplement the teaching activity and particular school discipline cannot be taught through these. There is needed such a teaching programme which can become a part of teaching learning activities in the school so that the researchers can suggest the school teachers the effectivity of the tested programmes of methods of teaching.

Gentner and Gentner (1983) reported that analogies aided problem solving in the area of the electric circuit. They further showed that the analogy employed considerably influenced the problem-solving process. They found that problem solving in the area of the electrical circuit among college and high school students was considerably different from when a “flowing fluid” or a “moving crowd” analogy was used. These finding point to the fact that the general framework that the analogy provides has a significant influence of the learning process.

Martis D’hima (1987) conducted an experimental study to find the effect of Synectics model on pupil’s creative thinking and academic achievement in science. The sample consisted of class IX students selected randomly from two sections of an English medium school. Twin group pre-test post-test design was adopted for the experiment. Torrance tests of creative thinking and achievement test developed by the investigator were the tools used. It was found that verbal and figural creativity and academic
achievement of experimental group had been significantly increased after the treatment. The difference between pre-test and post-test mean scores were significant at 0.01 level for the experimental. The difference be pre-test and post-test mean score of control group was also found to be significant.

**Clement (1987)** has studied the spontaneous use of analogies in a systematic manner. He investigated, for instance, how novices and experts employ analogies when solving physics problems. The main findings are that both novices and experts frequently make spontaneous use of analogies or at least of comparisons. The studies reconfirm that analogies are common tools for explaining and trying to make sense of the unknown.

**Malhotra (1990)** has investigated the effect of Synectics model of teaching on development of language creativity in Hindi. The students after being taught through this model showed more improvement on the factors of fluency, flexibility, originality and elaboration in the various areas of language skills. The improvement had a high positive correlation with the intelligence level of the students.

**Martis (1990)** attempted to find out the effectiveness of the Synectics model in developing 'Making Strange Familiar' (MSF) competencies and also its effectiveness in developing scientific and general creativity of graduate student teachers. It was found that the training in MSF significantly improved verbal, non-verbal and scientific flexibility and originality of trainees. These achievements of the training in MSF in turn led to the development of general and scientific creativity of school students. The findings of the study also suggested that MSF needed to be slightly modified in the light of class room situations.

**Anandi and Irene (1996)** undertook a study to prepare instructional materials based on synectics model of teaching for developing creativity. The instructional materials developed were found to be effective in increasing fluency and flexibility scores of verbal creative thinking but was not effective
in increasing originality scores. The worksheet of pupils were very useful for systematic presentation of matter. Besides they could be evaluated. It was found that stretching exercises are a must for Synectics approach.

**Sucheta (1996)** studied instructional and nurturant effects of Synectics model of teaching on creative ability in Hindi and English languages. The sample comprised of 250 students in VII, VIII and IX grades. It was found that Synectics model of teaching had its effect on improvement in all four factors of language creativity i.e. fluency, flexibility, originality and elaboration. The model of teaching was effective in improving general creative capacity of the students. There was significant increase in group cohesiveness. The results were similar in all three grades.

**Curtis and Reigeluth (1997)** analysed analogy use in 26 science text books. The use of analogies according to several categories (such as type of analogy or placement) was investigated. In total, 216 analogies were found i.e. 8.3 analogies performance book (ranging from 0 to 18). Two main types of analogy were distinguished, namely simpler ones based mainly on surface similarities and more elaborate ones based on what Curtis and Reigeluth called "functional relationships". In total, most analogies were of the latter kind (70%). Whereas this number was less than 50% in elementary books it was substantially higher in chemistry and physics books (about 90%). This result points in a similar direction to that of Glynn et. al. (1989) guidance toward effective use of analogies was not explicitly given in the introduction of the text books. Curtis and Reigeluth (1999) drew several conclusions from their study that may help to produce powerful analogies. They point out that analogies appear to be most useful for complex and difficult content. They view simpler analogies that are mainly based on surface similarities as only suitable for easier, more concrete topics, whereas more difficult and abstract topics require functional analogies, i.e., analogies based of deep structure similarities.
Gentner and Landers (1998) investigated access to analogies. These findings reconfirm on the one hand the results by Tenney and Gentner (1998) that the inferential power of analogies is governed by similarities of higher-order structure. On the other hand, they found that accessibility is governed by literal or surface similarities but not by similarities from higher-order structures.

Chandra Vaidya Nalakar and Mahapatra (1998) took up an experimental study to examine the effect of three treatments, Synectics model (SM), Gaming Strategy (GS) and Traditional Method (TM) of teaching towards creativity and their interaction with sex. The sample comprised of 162 learners of VI grade divided into two, the experimental and control group. The experiment was carried for four months. Intelligence and age of learners was controlled. It was found that the overall creative scores of the learners taught through SM, GM, and TM have differential effect upon creativity of boys and girls.

2.3 Creativity at School Level

Creativity children constitute one of the most valuable assets of our country. Our national progress depends upon them. A dearth of creative manpower is now felt in every branch of our national life, and is probably one of the highest bottlenecks to our progress. The national interest now demands increased emphasis on creativity in all branches of science, technology, literature and arts.

Taba (1963) warns “Without sufficient study of the meaning of creativity and its educational implications, to arrange programmes to develop creativity may not help us in the long run”.

Passow (1976) quotes “every component of education and schooling affects in detail. Teachers have the little insight into how our instructional sources help to develop or stifle innovative capacities of learners”. These
quotes emphasize that any training in development of creativity and the B.Ed., college level should be related to the high school children. Before selecting any method to train the graduate student teachers, the investigator left that knowledge of the present position on the developmental aspects of creativity in pupils is necessary. Therefore the investigator has discussed below the related studies on the development of creativity in B.Ed. course.

2.3.1 Development of Creativity of High School Pupils Related Studies

Many studies have been done all over the world to answer the question on the development of creativity of pupils. Some comprehensive reviews have been conducted by Parnes (1967), Torrance (1972), Massfield, Busse and Karepelka (1978), Parnes (1978) and Torrance (1986). Parnes reviewed forty studies. Ninety percent of these studies reported increase/in creativity by deliberately designed educational programmes.

Torrance (1972) conducted a survey of one hundred and forty two studies. He concluded that the percentage of success of these studies ranged from fifty percent to ninety percent which indicated clear cut possibilities of the development of creativity by deliberately designed procedures.

Massfields, Busse and Kerpelka (1978), surveyed sixty five studies, most of the studies have shown effectiveness of these training programmes in enhancing the creativity scores of the subjects. Rose and Tallin (1984) conducted a “meta analysis of long term creativity training programmes” the result of this analysis suggested that training does affect creativity. Similarly Cohn (1984) conducted a research Synthesis to evaluate one hundred and six published studies for their effectiveness. The results suggested that creativity can be enhanced.

In India Passi and Gayathri (1989) in their study “Developing Educational Implication of research findings in the area of creativity in Indian
In the following paragraphs the types of research studies have been discussed are.

a) Creative Problem Solving Method, b) Programmes for developing thinking skills, c) Complex programmes involving packages, (i) Feuensien Instrumental Enrichment Programme, (ii) Purdue Creative Thinking Programme, (iii) Productive Thinking Programme,

d) Training in creative Appreciation, creative perception and divergent thinking, e) Methods of Teaching, f) Methods for developing creativity. (Brainstorming, Morphological analysis, Role-playing and Synectics,

g) Special programmes developed by investigators, h) Transcendental Meditation, i) Other Programmes

a) Creative Problem Solving Method

The creative studies project (Buffalo 1969) Reger (1987) and Eagers (1982) studied the effect of Creative problem solving method. Results of the creative studies were extensive and highly positive. Eager’s (1982) findings showed that any gain or difference in creative productivity could not be directly attributed to the instruction in problem solving. Roger’s (1987) findings showed positive effect on the variables tested. Out of these studies only two studies showed positive results.

b) Programme for Developing Thinking Skills

Miller (1981), Johnson (1984), Buske (1985) and Mlire (1986) studied the effect of progress like CORT lesson of De Bono, Lateral thinking techniques of De Bono etc. for developing creative thinking skills. Of these four studies, Johnson (1984) and Buske (1985) used CORT lessons and both of them got positive effect on all measures of thinking skills of creativity. Other two studies used De Bono’s Lateral thinking techniques for training Meir (1986) got significantly effective result on Guilford’s test of divergent thinking and
Miller (1981) got nil effect in generating alternative solutions to figural problems. Among the four studies examined under this category three of these revealed a significant effect of the treatment.

c) Complex Programme Involving Packages

(i) Feuenstien Instrumental Enrichment Programme (FIE)

Ruiz and castanda (1983), Ruiz (1985), Feuentien et. al. (1979) and Feurestein et. al. (1985) used FIE programme for their study to find out its effectiveness for developing thinking skills. These studies and several other studies using this programme in Israel, Venezuela, Canada and the United States failed to find clear FIE effects and most for one reason or another, (e.g. weakness of the experimental intervention, conflicting outcomes on different measures inadequacies of experimental control, insufficiencies of the information provided were difficult to interpret).

(ii) Purdue Creative Thinking Programme (PCT)

Feldhusen et. al. (1970), Feldhusen et. al. (1971), Hubez et. al. (1979) Feldhuson et. al. (1976) and Pitts (1975) tried to find the effect of PCTP. Although there were several conditions highly effective with fourth graders follow up study, the programme failed to show any general long term effect on creative thinking abilities. Patel (1987) developed creativity in his sample.

(iii) Productive Thinking Programme (PTP)

Treffinger et. al. (1974), Feldhusen, Shovel and Treffinger (1972) and Gold and Houtz (1984) studied the effect of PTP and of these of studies of Treffinger et. al. (1974) and Feldhuson et. al. (1972) were comparative studies between PTP and PCTS. All studies showed significantly effective results in enhancing creative thinking abilities and PTP produced more consistent gains.
d) Training in Creative Appreciation, Creative Reception and Divergent Thinking


e) Teaching Methods

In this respect Haneock (1981) studied the effect of guided design, self instruction and group problem solving. Guided design did not improve the creative thinking ability. Mosher (1986) showed the effect of children’s literature and found increased ability to identify problems. Dividson (1981) used training in creativity and supervision related to childcare to the experimental and control groups and then reversed the treatment. The experimental group scored significantly higher to TTCT. Cebellos (1986) used inductive and deductive approach and got equally effective results in concept formation and higher order thinking. Foster (1981) stimulated creativity in small cooperative groups and got positive results. Nair (1978) used creative methods against traditional methods and got positive results. Shah (1981) tested four different teaching strategies and found that strategy with the use of audio-visual aids was significantly effective. Pillay (1978) taught Geography through morphological analysis and brainstorming and could not find differential effect. Miyen (1982) tried three method, “Tell and do”, “Guided discovery” and “Pure discovery” and none of them were significantly effective. Prasad (1979) applied the Discovery method of teaching against traditional methods of teaching and found the method
significantly effective in developing fluency, flexibility and originality. Of the ten studies reviewed under teaching methods six studies were significantly effective in developing creative thinking.

Beada (1979), Gupta (1977), and Deshmukh (1980) studied, techniques like brainstorming, role-playing, and Synectics. Beada (1979) used synectics model and found that it had potent influence on ideation output. Gupta (1977) used brainstorming technique but failed to see any significant effect except on fluency factor of seeing problem test. Deshmukh (1980) used brainstorming and role-playing technique and found significantly effective. Patel (1988) reported that brainstorming group did better on creativity and its components.

f) Special Programme Developed by Investigator

Albano (1987) used an experimental training programme which included invention activity, relaxation/visual stimulation and was successful in developing creativity. Fult (1980) developed an instructional programme and tried it on gifted and moderately gifted students and got significant gain in creativity. Kret (1979) tried conceptualization training and got positive results.

Rolisoo (1987) developed a systematic practice in generating alternative courses of action in decision making situations and found effective in real life situations. Davis et. al. (1979) developed a programme for thinking creativity which was a guide to training imagination and got 65 more creative ideas. Greffith (1988) tried deliberate and exaggerated use of imagination particularly connection making and Synectics and got significant improvement. Lloyd (1982) compared behavioural creativity enhancement programme with a stimulation creativity enhancement programme and found behavioural programme significantly superior to the other. Markwitz (1982) tried creativity intervention training and found that creative and flexible
thinking can be enhanced. Lerose (1987) tried systematic creative training and found it significantly effective in problem solving skills and higher order thinking skills. Schertz (1980) developed a total creativity programme for individualizing and humanizing the learning process and got certain traits like imagination, complexity, etc., improved.

Jarial (1981) developed a programme for verbal and non-verbal creative thinking abilities and found the programme significantly effective. Bhaskar (1981) evolved a programme based on some exercises providing training and found significantly effective. Upadhya (1981) conducted some training activity sessions, and found that a stimulating environment significantly increased creativity scores. Nerpharake (1977) applied integrated programme of creativity training and found it significantly effective. Vora (1984) reported that divergent thinking programme with and without feedback did increase creativity. Gupta (1984) found that the creativity training programme was successful in developing both verbal and non-verbal creative thinking in students. Singh's (1985) specially designed teaching strategy had significant effect on creativity and its different dimensions. In almost all the studies under this category significant effect was reported.

g) Transcendental Meditation

Ball (1979) compared transcendental meditation, TM siddhis programmes and course in developmental psychology and found that TM and TM siddhis significantly more effective than the other. NCERT carried out a study in this respect and got positive results. Sansanwal et. al. (1980) investigated the effect of TM and found certain components of creativity improved.

h) Other Programmes

George (1980) investigated a programme “talents unlimited” and the treatment worked for developing planning skills. Garber (1981) tried
"Igniting Creative Potential Programme" and could not find any improvement. Ouilling et. al. (1971) treated "Saturday Subway Ride" and supported the effectiveness of the programme. Rose (1985) tried the "Peabody Language Development Kits" (PLDK) and found the effectiveness. Shore (1987) studied the effect of "Longs Programming Experiences" and got positive results. Dongaphy (1988) tried "New Directions in Creativity Mark 1" and failed to got any improvement. Lowery (1980) tried various instructional methods like Now Directions in Creativity Basic (NDCB), New Directions in Creativity Enhanced (NDCE) Music and Imagery (MI) and found that MI was more effective. Amin (1988) found the creativity thinking programme could significantly develop creativity when the programme was utilized for twelve weeks. Michael (1988) reported that treatment for creative thinking was effective when certain personality variables were controlled.

Jnana Proboddini of Poona, has been conducting regular classes through which attempt are made to foster the creative thinking abilities of the students. The development of the creativity of students was started in 1978. At present this institution is imparting training in creative thinking to the students from grade V to IX.

It may be observed from the above review that attempts have been made to develop creativity. A number of procedures have been tried so far. Hence in the existing state of affairs it is not possible to form a final opinion regarding the adaptability or usability of a particular creativity developing procedure specially in the Indian culture. Like other cultures, in Indian culture also, it is very much possible to develop student's creative thinking abilities through deliberately designed creativity developing procedures.

Torrance (1986) in his review of researchers has quoted "there seemed to be listed or no tendency in experimental studies to embrace such disciplined procedures as Synectics". Jarial (1981) suggested "Synectics
method though found effective, more experimental research was needed in this area”.

The investigator was looking out for a method of developing creativity, in order to develop the creativity of graduate student teachers and to train them in developing creativity of their pupils. As explained earlier, it was felt that more work could be done in the area of “Synectics” which is a challenging and fascinating method. Therefore a further search was made by the investigator for the related literature on Synectics and its effectiveness on teachers and on other samples related to education.

2.3.2 Related Studies on the Effect of Techniques and Methods of Nurturing Creativity

Haughty (1984) used productive thinking programme for developing creativity. It comprised of self instructional material having sixteen programmed instructional booklets in which children were taught to become better problem solvers through the presentation of a number of detective problems and by utilizing several guide posts for effective thinking. The findings showed the significant effect of these programmes on figural fluency and originality of Torrance Test of Creative Thinking.

Talegaonkar (1984) made a study on developing teaching strategies to encourage students to solve problems in science creativity.

Gupta (1985) studied the development and evaluation of Creativity Training Programme (CTP) for sixth grade children and found that the programme was successful in developing Creative Thinking Abilities both verbal and non verbal among students.

Singh (1985) made a study of the effect of a Specially Designed Teaching Strategy and Socio-psychological factors on creativity among Middle School Children. The result showed that the specially designed
teaching strategy had a significant effect on creativity and its different
dimensions.

**Buske (1985) and M'lire (1986)** studied the effect of process like CORT
lessons of De Buno, Lateral Thiking Techniques of De Buno etc. for
developing creative thinking skills. The studies showed a positive effect on
all measures of thinking skills of creativity.

**Sharma (1986)** used different types of media, modules, silent films for
the development of creativity and found that successful employment of
stimuli did not depend upon their inherent quality but upon the teaching
climate within which they were presented and upon the teacher who carried
the atmosphere for imaginative responses.

**Nandanpawar (1986)** developed a creative method to develop
linguistic creativity in Marathi among students. The study found that the
method had a significant effect on language proficiency overall creativity and
all the abilities involved in linguistic creativity.

**Patel (1987)** used Purdue thinking programme to foster, divergent
thinking ability of verbal and figural, fluency, flexibility, originality and
elaboration among primary school children. The findings show a significant
effect of these programmes on creative ability of IV, V and VI grade students.

**Albana (1987)** used an experimental training programme which
included invention activity, relaxation, visual stimulation and was successful
in developing creativity.

**Lerose (1987)** tried systematic creative training and found it
significantly effective in problem solving skills and higher order thinking
skills.

**Shore (1987)** studied the effect of "Logs Programming Experiences" in
creative thinking and got positive results.
Patel (1988) and Rao (1988) tried to show the effectiveness of brainstorming in improving the creative thinking ability in Indian setup. The findings proved that brainstorming proved powerful for developing Fluency and Flexibility component of creativity.

Amin (1988) studied the effectiveness of Creative Thinking Programmes on the creativity level of the school children in relation to the programme correlates and found that (i) The main effect of the training on creativity by the programme was significant for creativity and its component I measures Fluency and Originality (ii) When the programmes I were utilized for as long a period twelve weeks, enhancement I of creativity seem to be superior irrespective of discussion and programme instructors.

Mohammad (1989) conducts a study to find out the effect of discovery method of teaming on creative thinking abilities of students. The findings showed that the discovery I method of teaching proved significantly effective in developing fluency, flexibility and originality dimensions of creativity.

Gurpas Agnela (1990) pressed a paper in which four steps were mentioned which helped to improve Creative Thinking they were (i) preparation, (ii) incubation, (iii) illumination, (iv) verification.

Shaughnessy Michael (1991) in his paper on the curricular of students “Creative Potential” gave suggestions for enhancing creativity in the classroom setting. The suggestions for enhancing creativity in the classroom setting. The suggestions were finding something positive in all ideas, systematically rewarding creativity, demanding activity of students giving credit for creativity in grading and modeling creative behavior.

Lawal (1991) in his study on the relationship between social studies classroom environment and the development creativity, recommended means of promoting creative skills.
Renzelie-Joseph's (1992) presented a general theory for developing creative productivity in young learners by examining interaction among teachers (abilities, interest, learning styles) the curriculum and the teacher.

Paul (1993) contented that the creativity dimensions of thinking is fostered best by joining it with critical dimensions.

Soriano-de-Alencar (1993) suggests the use of brain terming and attribute listing to produce new idea combinations.

Bampole, Ellen and others (1994) studied the “Use of Imagery” for creative writing for academically gifted students and found groups receiving guided imagery practice generated more original writing which contained more sensory description than comparison groups.

Gaekwad, Nautial, Pai and Paremu (1994) made a study to examine the effect of brain storming on the creativity scores of institutionalized and non-institutionalized girls within the age range of 10-15 years. The sample consisted of 26 institutionalized non institutionalized girls each. A significant elevation in the creativity scores following brain storming session were seen in the experimental group, particularly the institutionalized subjects.

Indu Bansal and Shika Agarwal (1997) conducted a study to find the difference in creative ability of young children of rural and urban community before and after exposure to computers over a period a time. The sample consisted of twenty four students of 4th and 5th class evenly distributed between rural and urban groups. These children were given Bacquer Mehdi's test of creative ability and were then randomly divided into two groups. A treatment group worked through computer using software Akansha and where necessary received coaching. The results showed a great improvement between the pre and post scores for the treatment group than for the control group no significant difference was found between rural and urban children.
2.3.3 Synectics and Creativity

One such method of teaching is synectics which can be used to teach sciences, social sciences or languages in the classroom. Researchers did test its effectiveness in the classroom for teaching various subjects.

Khatena (1973) attempted a study to ascertain whether college men and women identified as high and low creative would produce more original verbal images when taught to use creative imagery and analogy then they had previous to such training. For this, through a special training programme, the experimental group was taught to use simile, metaphor, personification and allusion as comparison form within the four analogy, personal analogy, symbolic and fantasy analogy, as suggested by Gordon (1961). Experimental were trained for 200 minutes (four sessions of 50 minutes each) over a period of 10 days. All the subjects were administered onomatopoeia and images (Khatena and Torrance, 1973) as a post-test and it was found that the training programme significantly increased the mean originality scores of the students.

Korth (1973) conducted a study to find out the effect of training in the synectics method of group problem solving and achieved limited success to college students. He further revealed that synectics training significantly enhanced associational fluency but had no effect on several personality measures or on rating of inventiveness and usefulness for two real life problems. Similar results were also supported by Perkins and his associates (1979). They used synectics model of teaching in order to teach general cross disciplinary skills including creative thinking. They committed three class sessions of two hours each to the method and found that although analogy is important in explanation and argument, it rarely contribute to discovery.

Bates (1975) made an attempt to investigate the comparative effect of two methods of helping ten and eleven year old students to solve three problems in elementary school science. One method consisted of providing a verbal principal with each problem. The second method involved the use of
analogy, that is, the connecting of seemingly unrelated qualities, states or objects, using the format of a problem solving approach called synectics, seven problems were designed for testing. To analyze the data, pre-test and post-test control group design was employed. The analysis of scores indicated that the students receiving analogues were not significantly superior in hypothesizing than those in the other groups. Further, they showed that male students receiving analogues were comparatively successful with this type of aid while females were not. The subjects in the analogues and principle groups scored significantly higher than the control group in forming new analogues indicating a possible training effect.

Khatena (1976, 1978) also made two attempts to find out the effect of synectics model of teaching and gave a number of suggestions for parents as well as teachers. He found that the students, who had learned not only to think in analogies but also to deliberately use analogies as needed, stand an excellent chance of being creative and inventive as well as good problem solvers.

Another study was carried by Brown (1980) to see the effect of training in connection-making on student's vocabulary, reading skill and self-concept. For this, three groups of the students were taken as a sample. The first group i.e., experimental group, was trained in synectics education system's connection-making using material. The second group i.e., control I group had sessions using materials adapted from those used by the experimental group. The third group (control group II) had no sessions. The results showed no significant difference after training However, it is indicated improvement in reading of sixth graders during the training period.

Passi (1985) also conducted a study to see the effect of synectics model of teaching on creative writing and showed a significant change in creative writing after the students were exposed to synectics model.
The findings of all these studies are inconclusive and conflicting. The reason may be that they used synectics model of teaching with different cultural samples and subjects. Another reason may be that they used different structural design of the model. Keeping these reasons in view, a need is felt effectively of synectics model is tested according to the structure of the model given by Gordon (1961). Further, as proposed by Joyce and Weil (1982) the model has its instructional and nurturing effects. The studies reviewed have not studied the effectiveness from the proposed point. There is a need to conduct studies to test the instructional and nurturing effects. The present study is a venture in this direction.

2.3.4. Factors of Creativity

While studying the effect of different teaching methods or programmes, researchers have mainly stressed on the study of factors of creativity like fluency, flexibility, originality and elaboration. These factors have been identified by Torrance (1962) as factors of general creativity. However, these may be different factors for specific creativity (Guilford) in sciences, languages or social sciences. In languages, like the general creativity factors, may be a specific factor of elaboration. Most of the researchers have not gone for the study of such specific factors. There is a need to study such specific factors which are specific to a particular creativity as an effect of method of teaching.

The studies reviewed here point out that the synectics model of teaching needs to be studied for its effectively the instrumental and nurturing effects as proposed by Joyce and Weil (1985) need to be studied language specific creativity factors have to be studied while studying the effectiveness of the model longer duration of the treatment for establishing the instrumental or nurturing effects of the teaching model, etc. It was with a view to filling these research gaps that the present study was undertaken.
The findings of the studies reviewed above the conflicting as well as inconclusive. Therefore, the directional hypotheses could not be conceived from the review. In this perspective, it was decided to have bi-directional hypotheses while comparing the effects of the synectics models of teaching with the conventional teaching method for all the dependent variables.

### 2.4 Studies Related to the Synectics Model of Teaching

Stretching exercises are a must for synectics procedure Chandhari, Vaidya, Navalkar Mahapatra (1998) conducted an experimental study to see the effect of three treatments; synectics model (SM) Gaming strategy (GS) and Traditional method (TM) of teaching towards dependent variable creativity and their interaction with six. The study was conducted upon 162 learns of VI grade divided into two experimental and one control group. The experiment was carried out of a period of four months. Intelligence and age were as controlled variables where as three treatments were taken as independent variables. The studies showed that the mean overall creativity scores of the learners taught through synectics model. Gaming strategy and traditional method has differential effect upon the creativity of boys and girls.

Necka (1984) conducted a study to find out the effectiveness of synectics as conditioned by socio-economic and type of task. Results showed that synectics proved effective in a quite favourable climate and in case of well defined problem.

Hofland (1985) in his paper presented at the Annual Meeting of American Theater Association described that three techniques that can be used to encourage right brain dominance in the generative step of the design process were random stimulation, lateral thinking and synectics.

Passi (1985) also conducted a study to see the effect of synectics model of teaching on creative writing and showed a significant change in creative writing after the students were exposed to synectics model.
Spingfield (1986) and Hartic (1986) used synectics on upper elementary gifted students and found it effective problem solving activity.

Griffith (1986) tried deliberate use of imagination particularly connection making with the help of synectics and got significant improvement.

Martis Anandi (1990) made a study on development of second strategy i.e. "Making the strange familiar". "Competencies in graduate student teachers through synectics model of teaching and the study of their reactions and the reactions of pupils"? The friends were

i) The total creativity of graduate student, teachers had developed except verbal flexibility.

ii) The training in synectics model of teaching had significantly developed making the strange familiar (MSF).

Sucheta (1990) conducted a study on the instructional and Nurturing effects of synectics model of teaching on creative ability in Hindi and English. The sample consisted of 250 students studying in VII, VIII, IX grades. The findings were:

i) Synectics model of teaching had its effect on the improvement in all the four factors of language creativity i.e., fluency, flexibility, origination and elaboration.

ii) Synectics model of teaching effected the improvement in general creative capacity of the students.

iii) Synectics model of teaching effected the improvements in the gain scores of essay / paragraph writing.

iv) Synectics increase in group cohesiveness scores was found after treatment.

Malhotra (1990) conducted a study to see the effect of synectics method of teaching on the development of language creativity in Hindi. The followings were:
i) The students who were exposed to the synectics method of teaching allowed significant improvement on all the four factors viz., fluency, flexibility, originality and elaboration as well as on their total scores of plot building aspect of language creativity.

ii) The synectics model of teaching affected the improvement of the students on all the four factors viz., fluency, flexibility, originality and elaboration as well as on their total scores of plot building aspect of language creativity.

iii) The students after the treatment of the synectics model of teaching showed improvement on the poetic dictation aspect of language creativity.

iv) The treatment affected improvement on all four factors viz., fluency, flexibility, originality and elaboration as well as on their total scores of the descriptive style.

v) The groups of students who were exposed to the synectics method of teaching showed significant improvement on all the four factors viz., fluency, flexibility, originality and elaboration as well as on their total scores of vocabulary test aspect of language creativity.

vi) The treatment affected improvement in the students who were exposed to the synectics method of teaching showed significant improvement on fluency, flexibility, originality and elaboration as well as on their total scores of language creativity. Besides the treatment levels of intelligence also affected the improvement. High intelligent students showed more improvement on fluency, flexibility, originality, elaboration and total score of language creativity than their counter parts.

Warute (1990) conducted a study to find out the effectiveness of Synectics Method and found it most effective for the development of scientific creativity in High School Students.
Kawenski-Mary (1991) in 'Encouraging Creativity in Design' describes a six week course for design students called “Needs Awareness and Design” which stresses the development of creative thinking skills. Synectics is stressed for actual problem solving.

Soriano-de-Alencar and Eunice (1993) in Thinking in the Future: The Need to Promote Creativity in the Educational Context suggests the use of synectics as a classroom exercise to produce new idea combinations.

Meador Karen (1994) made a study on 107 Kindergarten Children who either were or were not in a gifted programme and received or did not receive special training synectics and found significant improvement in creativity scores for experimental but not control groups but not more for gifted than for non gifted children.

Love–Cathleen (1994) in the Teaching Strategies to Facilitate Learning discusses Synectics as one of the teaching strategies.

Talawar and Sheela (2004) conducted a study on the synectics model of teaching. Education is one of the patent instruments for development of creativity and problem solving ability. If it is properly geared for this purpose.

Analysis which provide a bridge between a known concept and an unfamiliar concept are chief elements in synectics procedures.

2.5 Rationale of the Study
The findings of all these studies are in conclusive and conflicting.

- The reason may be that they used synectics model of teaching with different cultural samples and subjects.
- Another reason may be that they used different structural design of the model.

Keeping these reasons in view a need is felt that effectively of synectics model is tested according to the structure of the model given by Gordon
(1961). Further as proposed by Joyce Weil (1982) the model has its instructional and nurturing effects.

The studies reviewed have not studied the effectiveness of synectics model-strategy one and strategy two. There is a need to conduct studies to test the instructional effects. The present study is a venture in this direction.

2.6 Conclusion:

From the related studies on synectics method of nurturing creativity it can be noted that

1) Synectics is an effective technique in nurturing creativity
2) It is found effective in problem solving activity
3) It is useful in the development of scientific creativity
4) Synectics is effective in developing language creativity
5) Effectiveness of synectics is dependent on socio-economic climate and type of task
6) Synectics is effective among kindergarten students
7) Synectics is a success in classroom activities to produce new ideas, new, combinations etc
8) Creativity, both verbal and non-verbal can be nurtured
9) There are different methods to develop creativity
10) Development of creativity depends not only on the methods employed but also on the teaching climate and the teacher.

Educational research in general and research in the field of models of teaching in particular, are of recent origin. It is hopeful sign that research on models of teaching is generally receiving due importance.

It was observed that studies on models of teaching were by and large based on experimental designs. Most of the experiments have been carried out in actual classroom settings and are quasi experimental. Designing such studies in the classroom situation has an advantage of assessing the
effectiveness of a teaching strategy in real conditions. It was also observed that creative thinking and ability to solve problems could be enhanced by disciplined procedures like training in creative problem solving, creative writing exercise etc.

There were very few studies conducted on Synectics Model of teaching. Those which were available adopted the model for teaching in the subject of languages like Hindi and English. Though an action research was taken up by Anandi Marts and D'hima (1987) on Synectic of teaching science, its effect on composite creativity was found. The components of creativity like fluency, flexibility and originality were not studied separately.

There are two strategies of teaching in Synectics model. The first strategy refers to 'making strange familiar' (MSF) and the second strategy refers to making strange familiar. Most of the studies have adopted the first strategy. The second strategy i.e. the MSF approach has rarely been adopted. One study by Anandi Martis was taken up to develop MSF competencies through Synectics model of teaching in graduate student teachers. It was observed that there is no study on Synectics model of teaching Hindi at B.Ed. courses of DBHPS level adopting the Synectics Strategy-I and Synectics Strategy-II approach. It was also observed that development of achievement motivation which is an important side effect of Synectics model of teaching is not at all studied by the previous investigators. Hence the present investigation is a modest venture in this direction.

After having discussed the related studies and their implications to the present study the methodology followed in the study is being discussed in the next chapter.