CHAPTER III
REVIEW OF RELATED STUDIES

3.0 Introduction

3.1 Creativity in Education and its Correlates

3.2 Creativity Development Studies

3.3 Williams' Model

3.4 Gestalt view on creativity development and rationale of the present study
Chapter - III

REVIEW OF RELATED STUDIES

3.0 Introduction:

Research is an attempt to answer a question or find a solution to a problem. Before undertaking the study the investigator must acquaint himself with the recent studies undertaken by other investigators in the relevant areas. The review provides the investigator with background information and the present state of knowledge in his field.

In India there was very little research on creativity. There were not many entries relating to creativity in the surveys published in 1974 and 1979 which were edited by M.B. Buch. The development of creativity through school subjects received little attention. The first Indian Study in the area of creativity was undertaken by Bhattacharya in 1956. This was followed by different studies. In these studies creativity was investigated in relation to different variables. The studies can be broadly classified into two groups:

1. Creativity in Education and its correlates and
2. Creativity development studies.
3.1 Creativity in Education and its Correlates:


This study was undertaken to find out (i) the effect of home environment on the creativity of students and (ii) the effect of grades on the creativity of the students.

A sample of 150 students was selected from classes VIII, IX and XI of five secondary schools. The verbal and non-verbal tests of creativity by Mehdi and Sahu's scale of Cultural Background were used to measure the variables. The statistical procedure used was analysis of variance.

Results: There was significant difference in the verbal and non-verbal creativity between students with disadvantaged background and students with advantaged background. The latter were better.

There was significant difference in the verbal and non-verbal creativity of students of VI, IX and XI classes. Progressive development from VIII through XI classes was found.


This study has the following objectives:

(i) To compare the creativity of Science and art
students.

(ii) To compare the creativity of male and female students.

(iii) To compare the creativity of the students of very high, high, average and low strata of SES.

(iv) To find out the relationship of each area of creativity with scholastic achievement, intelligence, and Socio-economic status.

A sample of 300 students from various Higher Secondary Schools of Indore was used in the study.

The tools used were (i) Verbal creativity Test by Mehdi, (ii) The Socio-economic status scale of Kuppuswamy, (iii) The General Intelligence Test by Prayag Mehta (iv) The Scholastic achievement from School records.

The data was analysed using t-test and product-moment correlation technique.

Results: (i) Science students were significantly better than arts students in fluency and flexibility, (ii) Male students scored significantly higher scores than female students in fluency and originality, (iii) Students of very high SES were superior to students of high, average and low strata of SES in flexibility, originality and total creativity. The students of high SES were superior to the students of very high, average and low strata of SES in fluency. The students of high SES were superior to the students of low SES in total creativity.
and the students of very high SES were significantly superior to the students of low and average SES in fluency. (iv) Scholastic achievement was significantly related to different areas of creativity. (v) Intelligence was significantly related to fluency and total creativity of students.


The objectives of the study are: (i) To investigate the differences between low and high achievers in convergent thinking ability. (ii) To compare the differences between two groups of achievers on verbal creativity and non-verbal creativity.

The sample for the study was chosen from the IX class students of Malav Kanya Higher Secondary School, Indore. The sample size was seventy five.

The tools used were: (i) Saxena's Test of General Intelligence, (ii) Jalota's Test of General Mental Ability, (iii) Chawala's Test of Cognitive simplicity-complexity.

The statistical methods employed for analysis of data were product moment correlation, regression analysis, multiple correlation, and analysis of variance.
Results: (i) High achievers and low-achievers did not differ significantly on total verbal creativity and non-verbal creativity. (ii) Significant positive relationship was found between achievement and non-verbal fluency. Non-verbal flexibility and achievement were also positively related. Negative relationship found between (a) achievement and total verbal creativity and (b) achievement and non-verbal creativity was not significant. (iii) Science achievement was significantly related to measures of convergent production and not to divergent production. (iv) Multiple correlation between science achievement and the four predictor variables namely intelligence, cognitive simplicity-complexity, divergent production, and verbal, non-verbal creativity came to 0.435. Intelligence and cognitive simplicity-complexity were found to be the best predictors.


The objectives of the study were to find the relation between creativity, intelligence, socio-economic status and sex within a group of XII class students. The sample consisted of 112 students of XII class from a good school under Delhi Administration. The sample had 61 girls and 55 boys.
The tools used for measuring the variables were:

(1) Torrence Tests of creative thinking
(2) Kulashresta's socio-economic status scale
(3) Raven's Advanced progressive Matrices.

Employing the t-test, the investigator found (i) Boys and girls differed significantly in fluency, (ii) There were no significant differences between boys and girls in other factors of creativity, (iii) The results revealed a positive correlation between creativity and intelligence, (iv) There was no significant relationship between creativity and socio-economic status.


The investigation was undertaken with the following objectives:

(1) To study the personality correlates of creativity in secondary school teachers who were under training.
(2) The determination of personality differences in relation to sex and subject-group.
(3) Creativity differences in relation to sex and subject-group.
(4) Relationship of creativity with teaching-success.
(5) Preparation of norms for variables of personality and creativity.
The sample chosen consisted of 500 student-teachers enrolled in five training colleges of Punjab. Care was taken to give fair representation to geographical areas and sex. There were 200 male and 300 female teachers. The colleges were located in Patiala, Ferozpur, Amritsar, Jullundhar and Ludhiana. Their age ranged from 18 to 47 years. The mean age is 21.83 years. The sample was divided into Boys and Girls; extreme high and low groups; and subjectwise groups.

The difference between means test and Pearson's product moment coefficient of correlation were employed in statistical analysis.

The main findings of the study were:

(i) Highly creative persons did not enter the teacher training colleges. Only slight personality differences existed between high and low creative teachers. Intelligence was the only factor found as the personality correlate of creativity in teachers.

(ii) High flexible teachers were found to be more guilt-prone and less imaginative than low flexible teachers.

(iii) Intelligence and ventursome temperament were the most frequently observed personality correlates of creativity in female teacher trainees.

(iv) High creative female teachers were prone to self-conflict.
(v) Toughmindedness and suspiciousness were associated more with male teachers than with female teachers.

(vi) High creative science group was found to be more prone to sense of guilt than other groups.

(vii) Social boldness was predominant in high creative group of Science teachers.

(viii) The personality characteristics like higher intelligence, higher emotional stability, toughmindedness, and better adjustment etc., were found in the Science-mathematics group at higher as well as lower levels of creativity.

(ix) Imaginativeness was found to be associated with low creativity more in Science-mathematics group than in language-social studies group.


In this study the PCTP of Feldhusen and PTP of Covington were used. The sample chosen consisted of elementary school children.

The objectives of the study are:

(i) To evaluate the effectiveness of PTP and PCTP under self-instruction by pupils, compared with their use involving teacher participation.
(ii) To compare the effectiveness of PTP and PCTP in relation to each other as well as to control groups.

(iii) To compare the effectiveness of PTP and PCTP in classes taught by teachers who were high and low in divergent thinking ability.

(iv) To assess the effectiveness of the programmes with respect to several criteria of creative thinking and problem solving.

Seven hundred ninety three pupils and their teachers participated in the experiment. The subjects came from 36 fifth-grade classrooms in two public school systems. One is the northern region and the other central region of Indiana, United States.

The T.T.C.T. was administered to all teachers to determine their level of divergent thinking ability. On the basis of their scores the teachers were assigned to high and low groups. Then classes were randomly assigned to experimental arrangements (PCTP or PTP, 4 weeks or 8 weeks, Discussion or non-discussion). In discussion groups the teacher participated actively in the creativity activities. In non-discussion groups the teacher distributed the material, answered routine questions and supervised the classroom. The four controlled groups received no instruction. 2^4 Factorial Design was used.
The following tests were administered to all pupils in the experimental as well as control groups:

1. TTCT. All were given five sub-tests from Form B as pre-test and five comparable sub-tests from Form A as post-test.

2. The Old Black House Problem which was developed in the Berkeley creativity project was used as post-test.

3. Real life Problems, "Fighting on the play ground" and "life of school" were presented as post-test to all pupils. Both tests were scored for the number of solutions generated.

4. All pupils were given two verbal problem-solving tasks. Their answers were scored for the number of solutions produced.

Results:

1. Both PCTP and PTP produced significant improvement in children's divergent thinking ability.

2. When compared with control group both the programmes had significant effect on the creative Problem Solving ability of pupils.

3. When programmes were administered for short period (4 weeks), the non-discussion group with teachers of low divergent thinking did better than others.

4. The PTP group was less influenced by variations in the rate of presentation and teacher's level of divergent
thinking. For the P.C.T.P. group there was some effect of these factors.


The investigation had two parts. One part was the study of relationship among creativity and intelligence, academic achievement and security-insecurity. The other part was related to the study of relationship between creativity and security-insecurity. The sample chosen for the first study consisted of 200 boys and 200 girls of high school. The sample for the second study had 200 boys and the same age group as above.

Several studies were conducted to find out the relationship between creativity and many variables like intelligence, achievement, values, extroversion - introversion etc. It was found that scores on intelligence tests and achievement tests were highly correlated. The aim of the present study was to find whether any uniformity existed in the relationship among creativity, intelligence and academic achievement.
The tools used were: (1) Standard progressive matrices prepared by J.G. Raven. (2) Creativity test by N.S. Chauhan and G. Tiwari. This test measured creative production, fluency, original power, flexibility and ingenious solution of problems. (3) The achievement scores from the school records were used. (4) Security - Insecurity inventory developed by G. Tiwari was adapted.

Raven's standard progressive matrices were administered to all subjects to find out their level of intelligence. The creativity test was also administered to all the subjects. On the basis of test results High and Low creative groups were identified.

Product moment Coefficient of Correlation was computed.

The correlation between the variables was found to be highly significant. The correlation between creativity and achievement was 0.51 which was significant. There was correlation between creativity and intelligence. This study had revealed that academic performance of secondary students could be effectively predicted on the basis of intelligence and creative measures. The second study indicated that high creative children score significantly high on security-insecurity inventory.
3.2 Creativity Development Studies:


The P.C.T.P. consists of 28 audio-taped presentation of stories. Each is accompanied by printed exercises for the development of creative thinking and problem solving abilities. The taped programme consisted of two parts: (i) 3 to 4 minutes presentations conveyed a brief message concerning effective thinking. (ii) 8 to 10 minutes stories which focus on historical persons and famous events in history. The exercises for each Program have printed directions, problems or questions providing opportunities for the use of fluency, flexibility and originality in writing and drawing.

In developing the series the following goals were set:

(i) Focus on famous people and events that represent models of creative activities.

(ii) Present information as a stimulus and a vehicle for creative teaching.

(iii) Teach creative thinking and problem solving.

(iv) Involve students in creativity, verbal and drawing activities.

One program is presented each week. The tape and activities took about 45 minutes. The teacher gave a brief
introduction. Then the students discussed about the person featured in the programme. Thus students are motivated to listen the tape with attention. Later on activity sheets are distributed and discussed briefly.

There were about 15 published reports on PCTP. The review by Clinkenbeard (1980) was the most comprehensive among them. He found that children who were exposed to PCTP were better than control group in originality, fluency and language skills. Teacher effects were compared on PCTP and PTP. PTP produced more consistent results. It was found that children gained more when teacher restrained himself from extensive discussion of the stories. Both the programmes were highly effective in developing creative Thinking Ability.


This study was conducted by J.Z. Patel at S.P. University. The P.C.T.P. had 32 Programmes focusing on the life of great people and on events in American History. Out of these the investigator translated 18 programmes into Gujarati with necessary modifications. He developed similar programmes on Indian History. These are oriented to social
Studies. Each Programme consists of one creative activity worksheet. There are 3 or 4 similar exercises in the programme.

Three hundred and fifteen students of fifth grade participated in the study. They belonged to schools of Kheda District. Out of the 8 classes, 4 were experimental groups and 4 were control groups.

The creative ability test developed as a part of this programme by Patel was administered to students belonging to all the 8 classes. Then CTP was implemented for experimental group followed by discussion once a week. CAT was again administered as a post test to all students under study.

A 2 x 2 x 2 factorial design was used. Through ANOVA pupils performance on creativity and its components Fluency, Flexibility, and Originality was analysed. The Main Effect of treatment (Training by CTP) was significant for creativity and its two components measures Fluency and Originality. The Main Effect of IQ was significant, but that of sex was not significant. It was concluded that creativity training could be profitably imparted to the children in India.
3.3 William's Model:

Frank Williams (1970) had developed a cognitive affective teaching model. His argument was based on the principle "Thinking processes cannot really operate without feeling processes.... Nearly all cognitive behaviour have an affective component." It is possible to attain feeling goals by cognitive means and to attain thinking goals by affective means. For effective human development, the combination of both cognitive and affective domains is needed. The pupils' need for knowledge and information is closely related to his personality dispositions and his internal set of values.

Usually children ask questions. The teacher should not rush to them with an answer. He should encourage the children to explore possible answers. Under this approach pupils will become venturesome in their thinking, confident and independent in their temperament and courageous and appreciative of their own predictions.

According to Williams this type of learning has four advantages:

1. Pupils will actively produce responses rather than passively learn facts from book or teacher. The child realises that he is interacting with many things he already knows.

2. Children are provided opportunities to collect data on their own, organise and classify that data, and verify it
according to certain criteria. These thinking and feeling processes are ingredients of creativity.

3. To direct pupil's thinking and feeling process across school subjects idea lessons could be used. For this no special equipment is needed. Also the teachers need not abandon the good methods they are using.

4. This approach benefits all students. The gifted and talented, the underachiever and the slow learner are benefitted by this approach. Research had proved that creative talents are found distributed throughout any group of normal children in some degree.

Though the teachers knew that the child should be the center of interest and not the content they could not meet the needs of the child. There are very few models of teaching which could integrate pupil behaviours as desired outcomes with strategies that teachers can use across subject matter content.

The present model is a three dimensional structure which characterises an interrelationship between strategies employed by the teacher (Dimension 2) across subject matter (Dimension 1) in order to elicit pupil behaviours (Dimension 3).

Dimension 1: merely lists the subject matter area.

Dimension 2: lists eighteen styles or strategies which teachers can employ in their classroom teaching. These have been devised empirically from several studies of good teachers. Teaching
styles are means through subject matter content towards an end of fostering pupil behaviours.

**Dimension: 3:** Consists of eight processes deduced from theoretical studies of children's thinking and feeling. These are essential for encouraging a child's creative potential.

This dimension of pupil behaviours was broken down into two kinds of abilities. Four are thinking processes appropriate to productive - divergent thinking. They are fluent, flexible, original and elaborative thinking.

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluent thinking</td>
<td>Generation of a quantity</td>
</tr>
<tr>
<td>To think of the most...</td>
<td>Flow of thought</td>
</tr>
<tr>
<td></td>
<td>Number of relevant responses</td>
</tr>
<tr>
<td>Flexible thinking</td>
<td>Variety of kinds of ideas</td>
</tr>
<tr>
<td>To take different approaches...</td>
<td>Ability to shift categories</td>
</tr>
<tr>
<td></td>
<td>Detours in direction of thought</td>
</tr>
<tr>
<td>Original thinking</td>
<td>Unusual responses</td>
</tr>
<tr>
<td>To think in novel or unique ways...</td>
<td>Clever ideas</td>
</tr>
<tr>
<td>Elaborative thinking</td>
<td>Production away from the obvious</td>
</tr>
<tr>
<td>To add on to...</td>
<td>Embellish upon an idea</td>
</tr>
<tr>
<td></td>
<td>Embroider upon a simple idea or response to make it more elegant</td>
</tr>
<tr>
<td></td>
<td>Stretch or expand upon things or ideas</td>
</tr>
</tbody>
</table>
The four feeling processes are curiosity, risk taking, complexity and imagination. These are also as important as thinking processes. These are related to another important area of educational objectives which deal with attitudes, values, appreciations, and motivations of the pupil to want to do something with information and facts.

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk taking</td>
<td>Expose oneself to failure of criticisms</td>
</tr>
<tr>
<td>To have courage</td>
<td>Take a guess</td>
</tr>
<tr>
<td>To....</td>
<td>Function under conditions devoid of structure</td>
</tr>
<tr>
<td>Complexity</td>
<td>Defend own ideas</td>
</tr>
<tr>
<td>To be challenged</td>
<td>Seek many alternatives</td>
</tr>
<tr>
<td>To...</td>
<td>See gaps between, how they could</td>
</tr>
<tr>
<td>Curiosity</td>
<td>Bring order out of chaos</td>
</tr>
<tr>
<td>To be willing to</td>
<td>Delve into intricate problem or ideas</td>
</tr>
<tr>
<td>To...</td>
<td>Be inquisitive and wonder</td>
</tr>
<tr>
<td>To...</td>
<td>Toy with an idea</td>
</tr>
<tr>
<td>To...</td>
<td>Be open to puzzling situations</td>
</tr>
<tr>
<td>To...</td>
<td>Ponder the mystery of things</td>
</tr>
<tr>
<td>To...</td>
<td>To follow a particular hunch</td>
</tr>
<tr>
<td>To...</td>
<td>just to see what will happen</td>
</tr>
</tbody>
</table>
Imagination

To have the power to... Visualise and build mental images

Dream about things that have never happened.
Feel intuitively
Reach beyond sensual or real boundaries

Dimension - 2
Teacher Behaviours

<table>
<thead>
<tr>
<th>No. 1. Paradoxes</th>
<th>Common notion not necessarily true in fact self-contradictory statement or observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.2. Attributes</td>
<td>Inherent properties Conventional symbols or identities Ascribing qualities</td>
</tr>
<tr>
<td>No.3. Analogies</td>
<td>Situations of likeness Similarities between things Comparing one thing to another</td>
</tr>
<tr>
<td>No.4. Discrepancies</td>
<td>Gaps of limitations in knowledge Missing links in information What is not known</td>
</tr>
<tr>
<td>No.5. Provocative ques-</td>
<td>Inquiry to bring forth meaning incite Knowledge exploration Summons to discovering new knowledge</td>
</tr>
<tr>
<td>tion</td>
<td></td>
</tr>
<tr>
<td>No.6. Examples of change</td>
<td>Demonstrate the dynamics of things Provide opportunities for making alterations, modifications or substitutions.</td>
</tr>
</tbody>
</table>
No. 7. Examples of habit Effects of habit bound thinking
Building sensitivity against rigidity in ideas and well-tried ways.

No. 8. Organised random search
Using a familiar structure to go at random to build another structure.
An example from which new approaches at random.

No. 9. Skills of search
Search for ways something has been done before (historical search)
Search for the current status of something (descriptive search)
Set up an experimental situation and search for what happens (experimental research)

No. 10. Tolerance for ambiguity
Provide situations which puzzle intrigue, or challenge thinking.
Pose open-ended situations which do not force closure.

No. 11. Intuitive expression
Feeling about things through all the senses.
Skill of expressing emotions.
Be sensitive to inward hunches or nudges.

No. 12. Adjustment to development
Learn from mistakes or failures
Develop from rather than adjust to something
Developing many options or possibilities.
No. 13. Study creative people and process
Analyse traits of eminently creative people. Study processes which lead to problem solving, invention, incubation, and insight.

No.14. Evaluate Situations
Deciding upon possibilities by their consequences and implications Check or verify ideas and guesses against the facts

No.15. Creative Reading Skill
Develop a mind-set for using information that is read. Learning the skill of generating ideas by reading.

No.16. Creative Listening Skill
Learning the skill of generating ideas by listening Listen for information allowing one thing to lead to another

No. 17. Creative Writing Skill
Learning the skill of communicating ideas in writing. Learning the skill of generating ideas through writing.

No.18. Visualization Skill
Express ideas in Visual forms Illustrating thoughts and feelings. Describing experience through illustrations.
The above model was tried and field tested across all ability levels of children and was found to be good. F.E. Williams had developed two volumes of "Classroom ideas for encouraging thinking and feeling." (Williams 1970). The ideas are meant for three levels of students. They are primary, middle and upper grades. They were found to be effective with slow, average and fast learners. Williams' claim is that all children are creative to an extent and it is possible to nurture it.

3.4 Gestalt view on creativity development and rationale of the present study:

A knowledgeable, creative individual is an asset to any society and more so to a developing society like that of Bharat. Training a child for allround development is the prime function of education. As most of the child's development and training takes place in the classroom the improvement of teaching and learning assumes paramount importance.

The research done in the field of education reflects this concern for improving classroom teaching. The present day teaching of various school subjects and especially mathematics aims at developing convergent thinking ability. But research had shown that divergent thinking is equally important. Thus both are needed. They complement each other. Therefore creativity is regarded as the highest level objective.
The review of research studies made in this chapter showed that certain factors like socio-economic status, intelligence, and personality had effect on the creativity of children. These studies also established that creativity could be developed through the use of suitable programmes like PCTP, CTP, and Cognitive-affective model of Williams.

For the modern technological society a good grounding in mathematics is a must. This can be seen in the inclusion of mathematics in the study of economics, commerce and biology. This is one compelling reason for taking a project of improving the teaching of mathematics. The CTM was developed with this purpose.

A student's performance in school is judged by his achievement. Though attitude is not measured by the school authorities it is an important affective component of learning. Hence these two variables were chosen for measurement.

In addition to the teaching model, biological factor sex, psychological factor motivation, socio-economic factor Parental Education influence learning. The effect of these factors on achievement and attitude are studied in this investigation.

The above considerations support the appropriateness of the investigation.