"Productive thinking' as consisting in those divergent, convergent and evaluative operations whereby the individual draws upon available past and present acts, ideas, associations and observations in order to bring forth new facts, ideas and conclusions. Productive Thinking, so defined includes both the creative and critical-analytic dimensions of reasoning."

-Gallagher
-Aschner
CHAPTER III

A LOOK INTO THE PAST RESEARCH:

3.0 INTRODUCTION

3.1 TYPES OF STUDIES ON CREATIVITY

3.2 CREATIVITY DEVELOPMENT STUDIES:
CREATIVE THINKING PROGRAMME

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3.3 CREATIVITY DEVELOPMENT STUDIES:

PRODUCTIVE THINKING PROGRAMME

Study-4: Developing the Skill of Productive Thinking
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3.4 CREATIVITY DEVELOPMENT STUDIES:

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Study-7: An Experiment With a Programme for Creativity Development - Jarial

Study-8: Creative Teaching Techniques in Biology. V.N. Shreelatha and Methew George.

Study-9: Divergent Thinking Programme in Maths for Std. VIII - R.V. Patel

Study-10: Teaching Techniques in Science to develop creativity. - B.B. Shah

3.5 CREATIVE THINKING PROGRAMME:

ITS CORRELATES

Study-11: Improving Children's Creative Problem Solving Ability. The Purdue Creativity Project.

Study-12: Creativity as Related to Intelligence, Academic achievement and Security-Insecurity.

3.6 RATIONALE OF PRESENT STUDY
3.1 INTRODUCTION

The review of related study is nothing but a look into the past research works done in the specified fields. This is a very significant aspect of the research process as pointed out by William Wiersma, "Educational Research is not or at least should not be, carried out in any information vacuum."

The review of related studies helps the researcher by providing some information about the status-quo of knowledge in the area intended to study. It provides the researcher with information related to the type of study and type of design that may be eventually used in conducting research. Research works done in the past serve as solid foundation on which any new investigation firmly rests.

Very few studies have been made to trace the deve-
lompent of creativity through the school subjects even in foreign countries, as Tuckman says, every serious piece of research includes a review of relevant research. A researcher begins with ideas and concepts that are related to one another through a hypothesis.

Hence accepting the importance of a review of the past work. The present investigator tries to go through the available literature and the research reports and review them with special reference to the types of studies in creativity.

3.1 TYPES OF STUDIES ON CREATIVITY

The systematic past study of researches in creativity has been made as follows:

(A) Creativity and Intelligence

There were the times when creativity and intelligence were thought as one and the same thing. But it is not so now. Now-a-days researchers have tried to establish a close relationship between these two different mental abilities. Different researches like creativity related to intelligence, a study of creative thinking with special reference to intelligence. Creativity and its components
are affected by intelligence and relationship of intelligence and fluency among students are included in the field.

It was observed that to a certain extent creativity and intelligence go together but then take different directions. Sometimes highly creative subjects need not necessarily to be highly intelligent.

There is no consensus regarding the relationship between creativity and intelligence and still it is a debatable issue.

(B) Creativity and Personality

The personality structure of a person also plays an important role in the invention, imagination, or production of a creative work.

It is also related to personality of a creative child. Creativity and personality growths—trends of creativity, personal variables, personality correlates to creativity, creativity as related to the values of the Indian adolescent students.

(C) Creativity and Education

The goal of Education is to develop capabilities, Individual expressions, inventiveness and gifted leadership. This cannot be fully attained without the adequate and
accurate knowledge of creativity.

There are indications that our whole educational structure is unable to assess creativity. But actually it is a biased notion. Most of the teachers do not care much for the unusual 'off-beat' child who give answers. That do not conform to same predetermined idea of what is correct.

Different researches give reviews about Teachers Creativity and Family background, a study of relationship, creativity and academic achievement among school pupils. Creativity is significantly related to achievement, anxiety, Independent education and occupation.

(D) Creativity and Its Measurement

This includes the trends and status of testing in creativity problems in measurement of creative thinking and their uses.

(E) Researches on Creativity Development

This is a branch of research in the field of creativity which is the most important. Only a few researches have been done. Some well known researches are listed here, e.g. Special Programmes for Developing Creativity, Techniques for Development of Creativity, Creative Problems Solving and also Divergent Thinking Programmes etc.
From the classifications given above, some researches related to the creativity development are discussed hereunder in the following categories:

1. **Creativity Development Studies:**
   - Creative Thinking Programmes.

2. **Creativity Development Studies:**
   - Productive Thinking Programme.

3. **Creativity Development Studies:**
   - Thinking Programmes based on School Subjects.

4. **Creative Thinking Programme:**
   - Its correlates.

### 3.2 CREATIVITY DEVELOPMENT STUDIES:

#### CREATIVE THINKING PROGRAMMES

The reviews of the studies regarding creativity developments due to creative thinking programmes have been made through all the necessary phases of Research Methodology.

**Study-1 Development of Purdue Creative Thinking Programme (PCTP)**

This programme has been prepared by Feldhusen.

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Treffinger and Bahlke in the Purdue University. The programme was first prepared in 1970 and was finally revised in 1981. The review will be studied with respect to the description of the procedure and goals to provide directions for efforts. Finally results and research finding will be discussed.

**Description**

The Purdue Creative Thinking Programme (PCTP) consists of 28 audio taped presentation and stories, each accompanied by printed exercises for the development of creative thinking and problem solving abilities. The taped programme consists of two parts (i) 3 to 4 minutes presentations convey a brief message concerning effective thinking, (ii) 8 to 10 minutes stories which focus on historical persons (inventors, discoverers and national and world leaders) and famous events in history. The exercises for each programme consist of printed directions, problems or questions which are designed to provide opportunities for the use of fluency, flexibility and originality in writing and drawing.

The content of the audio tapes focuses on social studies. The series also teach writing and listening skills which are related to the language arts. The programme is designed to be administered in a group setting or individual learning.
In developing the series some goals to provide directions for efforts were formulated as under:

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

2) Present information as a vehicle and stimuli for creative teaching.

3) Teach creative thinking and problem solving.

4) Involve students in creativity, verbal and drawing activities.

5) Use auditory rather than visual stimuli to encourage imagination.

6) Undertake a substantive programme of research and formative and summative evaluation.

A typical format is of presenting one programme each week and to devote about 45 minutes to the tape and activities. After a brief introduction by the teacher, the children can discuss what they know about the person featured in the programme. This motivates the children to listen carefully to the tape B played for about fifteen minutes. Activity sheets are then distributed and discussed briefly to make sure that the children understand the instructions.

Some exercises stress verbal fluency, flexibility and originality are strengthened by non-verbal exercises.
Figural activities stress elaboration along with the above factors.

Results and Evaluation

There are at least 15 published reports summarising research and evaluation on PCTP. The most recent is an extensive review of Clinkenbeard in 1980. It can be summarised briefly as under:

One of the first major study shows that children who had experienced the programmed, scored higher than the controlled group on verbal and figural originality, verbal fluency, non-verbal elaboration and language skills. A subsequent project showed increasing fluency and originality especially of the fourth grade level. For children who had been through the programme. It was also found that activities were most effective parts of the programme. Stories were equally effective and introductory presentation was somewhat less effective.

In another study teacher's effects were investigated in the context of a comparison of the PCTP and PTP. Both were found effective in producing creative thinking gains but the PTP produced slightly more consistent gains. It became evident that children make greater gains when a teacher retreats from extensive discussion of the stories. Some scientists carried out further tests regarding the
the effects of spaced in massed programme used on problem-solving skills. Again comparing PCTP with PTP they found both the programmes effective in developing creative thinking ability and determined that the teachers leadership role can facilitate greater creative growth when programmes are used over a longer rather than massed period of time. Overall it seems that one may conclude optimistically that the PCTP is effective in developing creative thinking abilities and some related attitude by skills.

Teacher too can learn a great deal about creative teaching from the introductions to the tapes. The programme has at best limited effectiveness, though like other creative thinking programmes, it is perceived as a valuable and enjoyable experience for teacher and students alike.

Study-2 Effectiveness of Creative Thinking Programme

This study was done by J.Z. Patel2 at the Sardar Patel University, Vallabhbh Vidyanagar.

The PCTP consists of 32 programmes focussing 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. Further he developed other similar programmes based on Indian history. The series of 25 international people and events is essentially oriented to social studies since it is a biographical series, it also relates very closely to school curriculum. Each programme consists of one creative activity worksheet. It also contains 3 or 4 similar exercises.

Sample

A total of 315 fifty grade students from 8 classes of 14 schools at three talukas of Kheda district, participated in this study. Out of 8 classes, four classes were treated as experimental classes. (CTP) and four classes were treated as controlled classes.

Procedure

The creative Ability Test developed as a part of this programme by J.Z. Patel was administered to all students of 8 classes with a view to framing equal groups. Then the creative thinking programme (CTP) was implemented in experimental group followed by discussion, once a week. For first 3 weeks and then twice a week for the rest 11 weeks. CAT was again administered as a post test to all students under study. General Ability Test (J.Z. Patel) was administered to obtain IQ of each child.
Statistical Analysis

The equal groups were formed on the basis of the creativity test (pre-test) scores. A 2x2x2 (Treatment x IQ x Sex) factorial design was used and the analysis of variance (ANOVA) was used to analyse the pupil performance on creativity and its components measure: Fluency, Flexibility and Originality.

Results and Discussions

The main effect of treatment—The Training of Creativity by Creative Thinking Programme was significant for the creativity and its two component measures: Fluency and Originality.

The main effect of IQ was significant but that of Sex was not significant.

Thus it could be said that creativity training could be profitably imparted to the children in the developing countries like India.

Study-3 Creativity Training in Elementary School In Brazil

This study was done by John Feldhusen and Fred Widlak at the Uni. of Bázitia. In the present study 14

out of 26 stories of the PCTP and the corresponding exercises were used with a sample of children in Brazil. The choice of 14 dramatized stories was based on their relationship to the programme of history and social studies in Brazilian schools. The programmes were translated into Portuguese by the first author.

Sample

A total of 578 fourth and fifth grade children from 24 classes in both private and public elementary schools in Brazil participated in the study. There were 12 fourth grade and 12 fifth grade classes with eight classes assigned to each of two treatment conditions (programme with reinforcement of pupils performance on the creativity exercises and programmes without reinforcement of pupil's performance on the creativity exercises) and 8 classes assigned to the control group conditions.

Procedure

Before instruction began two verbal sub-tests (unusual and product improvement) and two figural sub-tests (circle and picture completion) of the Torrance (TTCT) were administered as pre-test to all pupils in both the experimental and controlled groups. The tests were translated into portuguese. The instructional material was then administered to the experimental groups by the teacher once a week. For the 14 consecutive weeks the teacher read the
introduction and the story to the children since tape players were not available. The pupils then worked on the printed exercises. In one experimental condition (Programme with reinforcement) the children's completed exercises were evaluated by the experimenter. She wrote encouraging comments on their papers intended to reinforce fluency and elaboration (e.g. very good) good, good but try harder, the harder etc., and then gave back to the children. Pupils in other experimental condition received no enforcement. Pupils in the controlled group received no creativity training. At the end of 28 weeks TTCT form A was administered as post-test to all pupils of the project.

A 3x2x2 (Treatment by Sex by Grade level) analysis of co-variance was used to analyse pupil performance on each of the 12 creativity measures. Previous research indicated that the creativity sub-tests were task specific and should be analysed separately. The co-variates for the divergent thinking measures were the respective TTCT pre-test measures. Post hoc individual comparisons between adjusted means were made for significant effects using the Newmankeuls procedures. Further analysis of co-variance were carried out to analyse the effect of treatment using the class as the sampling unit.

Results

Using individual subject as the sampling unit, a
consistent finding across all dependent variables was that no interaction effect reached statistical significance. The main effect of treatment was significant for all the three creativity dimensions of Fluency, Flexibility and originality for lines and unusual uses sub-tests. Here the treatment effect was also significant. For figural originality on the product improvement sub-test, the effect of classes within treatments was significant for figural fluency on the lines and picture completion sub-tests, for figural flexibility on the lines sub-test; and for verbal originality on the unusual uses sub-test. The significant classes within treatment effect indicates differences among the classes in the effectiveness of the programme.

3.3 CREATIVITY DEVELOPMENT STUDIES:
PRODUCTIVE THINKING PROGRAMME

Productive thinking is a basic need for the creative thinking. So here the investigator cite some reviews of the studies specially associated with the productive thinking programmes to enhance the creativity of the children.
Study-4 Developing the Skills of Productive Thinking

This productive thinking programme (PTP) is developed by Covington, Crutchfield and it was in 1966 at the University of California. This set of booklet material designed primarily for Vth and VIth grade students, provides systematic instruction and carefully guided practice in the skills of productive thinking and problem solving. 16 programmed booklets are individually self administered and self-paced each requiring approximately one hour.

Each lesson is designed in such a way that a student working through the problem is eventually to discover the solution for himself. This gives him thrill of discovery and help him to develop a sense of confidence in his ability to cope with difficult and challenging intellectual tasks.

A total of 280 students comprising five Vth grade and VIth grade classes participated in this study. These students were generally above average in intellectual ability. The mean IQ of the group of the Stanford Achievement Battery. In order to equate these two grades for influence of a particular teacher and a particular classroom climate.

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A split class technique was used. Half the students of each class were selected to receive instruction in productive thinking, while the other half of each class served as a non-instructed controlled group.

Both the groups were given a pre-test battery of productive thinking problems to determine the extent to which any difference in productive thinking proficiency existed before instruction began. Then during the next 8 weeks the instruction group devoted approximately one hour per day to instructions in productive thinking, while the controlled group also spent one hour daily in activities consisting of stories, movies and various project chosen to interest the children and to have general educational value, but not related to productive thinking. At the end of 8 weeks period performance of the two groups was compared on an extensive post-test battery of thinking problems.

These studies have consistently been found to produce significant gain in student performance on a variety of tests of productive thinking. The trained students have demonstrated strengthened skills in cognitive functions as generating ideas of high quality, asking relevant questions, being sensible to crucial clues, making effective use of informations and achieving solutions to problems.

At various points in booklet lesson, the student practises using such skills and writes down his ideas,
questions or suggestions about the work to be done next. The student is led to understand what constitutes relevant and original ideas, how to proceed fruitfully when faced with challenging problems and what effective strategies to use when he encounters difficulties.

**Results**

Performances of the instruction and controlled group were nearly identical on the pre-test battery indication that they were well matched in productive thinking proficiency before instruction began. Indeed the small difference that did exist favoured the controlled group.

After the instructional programmes had been computed, a clear and substantial superiority in thinking was shown by the instruction group.

On the follow-up battery, performance of the instruction group continued to surpass that of the controlled group by significant margin. Thus the gain in thinking skills produced by the 8 weeks of instructions was still evident more than 6 months after instructions had ended.

The same study has been replicated by Olton and Wardrop in 1967.
"An investigation into the impact of Divergent Thinking Programme in Mathematics on the creative levels of the children of classes VII and VIII."\(^5\)

**General Objectives of the Study**

1) To provide the reliable divergent thinking programme in mathematics.

2) To study the effect of divergent thinking programme in mathematics on the creativity of students of Std. VII and VIII with respect to reinforcement i.e. Feed back.

3) To study the effect of DTPM on the creativity components viz. Fluency, Flexibility and Originality.

4) To investigate whether the grade difference in the creativity is there or not.

5) To investigate whether the sex difference in the creativity exists or not.

**Sample**

One school complex with co-educational system in Gujarati medium was chosen for the experiment. Three classes of Std. VII and VIII from a school in Ahmedabad city

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were selected. Then 3 equal groups of each standard were formed (A control group and two experimental groups). One experimental group was formed as a group with feedback and other experimental was called a group without feedback. Thus there were 4 experimental groups with 181 students and two control groups with 90 students in all. (Total 271 students: 130 from Std. VII and 141 from Std. VIII).

**Tools**

Main tools used in this experiment were PTC and DTPM.

(1) Passi test of Creativity (PTC). PTC contained 6 tests, 4 tests, were verbal and remaining non-verbal. In this study the verbal tests were used.

(2) Divergent Thinking Programme in Mathematics. The DTPM tool was prepared and tested as an instrument for creativity. It contains 3 types of problems (i) Multi-Response, (ii) Hidden shapes (iii) Make-up Problems.

**Statistical Method**

Analysis of pre-test score and post-test score was made for all the 6 groups (for both, the grades as well as sexes separately). The ANCOVA method was applied.

**Findings of the Studies**

Various findings were considered together and
discussed objectives were narrated with reference to the hypothesis, observations and conclusions.

(1) Divergent thinking programme in mathematic was an essential tool to develop the creativity of VII and VIII grade students.

(2) The programme was equally useful to develop creativity in either sex.

(3) DTPM was an essential tool to increase the fluency, a creativity component of the students of both the standards.

(4) DTPM was not helpful to get changes in flexibility scores.

(5) DTPM was useful but the training was not effective for originality.

On the whole, the results derived from the analysis were very interesting and encouraging, and they showed that creativity can be developed through DTPM.

3.4 CREATIVITY DEVELOPMENT STUDIES:

TRAINING PROGRAMMES BASED ON SCHOOL SUBJECTS

Study-6  Effectiveness of Verbal Creativity Instructional Materials of School Stage
S.B. Bhasker has undertaken the above study for his doctoral work.

Sample:

The sample comprised 51 + 36 students of std. VI of 15 schools of Bangalore district. The 15 schools from 3 educational district, i.e. 5 each from each district were selected. Single group pre-test design and post-test design was selected.

Hypothesis

(1) There will be no significant difference in the effect of verbal creativity instructional materials on the students of different creative potential.

(2) There will be no significant difference in the effect of verbal creativity on the students of different socio-economic status.

Procedure

Passi test of creativity comprises six tests, 3 verbal, 2 non verbal and 1 with non verbal stimuli but verbal responses. Four of the tests, 3 verbal tests and

1 with non verbal stimuli with verbal responses were selected as the instructional materials that would be developed only in verbal form. The four tests viz., seeing problem test, unusual uses test, consequences test and test of Inquisitiveness, were translated into local language Kannada. As the children of Std. VI would not be fluent, and fast in writing as their counter parts in secondary, higher secondary schools. The time per test was increased by \( 1\frac{1}{2} \) times. The tests with increased time duration were administered by the investigator in all the schools.

Students of both the schools were provided the cyclostyled copies of verbal creativity instructional materials, enough space was left for students to work out. The investigator read the first half of the story and motivated the students. The children had to solve the puzzles, riddles etc, only after they solved all the puzzles, the second half was read to them. Before and after administration of these materials PTC were administered as pre-test and post-test. Then they were given a creative rating scale.

Findings

Out of the three levels of creativity high, middle and low, null hypothesis was rejected in case of middle and low creative potential groups and not in case of high creative potential group.
Study-7  

An Experiment with a Programme for Creativity Development

This study was carried out by Jarial, in 1981.

Both the forms of the programme (verbal and non-verbal) include 25 lessons each. Each lesson contains 2-6 items. The items pertaining to the verbal form of the programme have the content from the immediate environment of the students i.e. home and school and the non-verbal form of the programme contains the geometrical figures, such as points, triangle, squares etc. and sketches as its content. The experimental part of the study followed a pre-test post-test experimental controlled group design. The group undergoing treatment in verbal form of the programme consisted of 80 students who were divided into comparable (on basis of IQ scores and the scores on the components of verbal creativity) groups—Experimental and controlled. The students of the experimental group were given treatment in verbal instructional materials whereas no treatment was given to the students of controlled group.

The non-verbal treatment group also consisted of 80 students who were divided into two comparable groups (on the basis of IQ scores and the scores on the components of

non verbal creativity). One of these groups was named as the experimental group and the other was named as the controlled group. Like the verbal treatment group, here too the students of the experimental group were given treatment in non-verbal instructional material whereas no treatment was given to the students of the controlled group.

The treatment given to the students of experimental groups continued for 50 days utilising one period of 35 minutes duration per day. On one set of alternate days the students were administered the lessons from the instructional material and on the other set of alternate days discussion around the already completed lessons was done. The TTCT, Form A (verbal and figural) were administered to the students of the respective groups of present stage, and their parallel tests (TTCT Form B) were administered to the similar students at post-test stage.

Result

The results showed a significant effectiveness of the programme in developing different components of verbal creativity and various components of non-verbal creativity of the students.

The development of the various components of verbal creativity as a result of training in the programme was observed to be independent of the effect of sex, Socio-
Economic status and initial creativity levels.

The development of different components of non verbal creativity was not influenced by the variation is Socio-economic status of the students.

The sex and initial creativity levels did not seem to affect the development of different components of students' non verbal creativity, except elaboration, with respect to which the female students and the students of initially low creativity levels gained significantly higher than male students and the students of initially high creativity levels.

Study-8 Creative Teaching Techniques in Biology

V.N. Shreelatha and Mathew George have undertaken the study as "Effect of Creative Teaching on Creative Thinking of Adolescents."

An ordinary private school was the venue of the experiment, as there were only 12 students in class IX, continuous and intensive interaction was possible between teacher and the taught. So the sample was selected keeping

the possibility of personal relationship and in depth interaction in a small classroom which was natural after establishing rapport. The Mehdi's (1973) Verbal and non-verbal test of creative thinking were administered as present. Then 17 lessons in Biology were taken involving the pupils according to the lesson plans without disturbing the class time table. After a month post-test was conducted using the same tool. To test the hypothesis, significance of the difference between the pre-test and post-test raw score means were used.

**Result**

The pre-test and post-test raw scores of 12 pupils for verbal fluency, verbal flexibility, verbal originality and verbal elaboration and non-verbal originality were found to be high and 't' values were significant at 0.01 level. Hence null Hypothesis relating to verbal creative thinking of pupils (4) and non verbal creative thinking(2) were rejected.

**Study-9**  
*Divergent Thinking Programme in Maths for Std.VIII*

A preparation and tryout of divergent thinking Programme in maths for std. VIII - by R.V. Patel.
Sample

This study was carried out in rural area of Bayad Taluka in Sabarkantha District, in Gujarat. The sample of 60 students was selected from one school. It was selected and divided into 2 groups called experimental and controlled groups.

Tools

(1) Verbal Creativity test of Baquer Mehdi.

(2) Divergent Thinking Programme in Mathes prepared by the investigator.

Procedure

Pre-test Post-test design was selected. Verbal creativity test of Baquer Mehdi was used for the same. Programmes were prepared in mathematics for the creativity training of the students especially 'algebraic expression' was selected. For it ten programmes of divergent thinking were prepared in a logical sequence and tryout. These programmes of divergent thinking were implemented by the investigator thrice a week, while the same topic of algebraic expression was taught to the students of controlled group by the traditional method. The pre-test and post-test were conducted and the answersheets were scored according to the test manual.

To test the hypothesis, analysis of covariance (ANCOVA) technique was used to analyse pupil's performance on each of
the creativity measures i.e. Fluency, Flexibility and
originality, and total Creativity Score.

Result

The main effect of the Treatment was significant for
total creativity score. Moreover treatment effect was also
significant for fluency and flexibility but not for origi­
nality.

Study-10  Teaching Techniques in Science
to Develop Creativity

An Experimental investigation of the effects of
Selected teaching strategies on the development of
Creative Thinking and Achievement in Science.10

The objectives of the study were—

(1) To find out the effectiveness of the strategies
St₁, St₂, St₃ and St₄ on the development of creative
thinking ability of standard VII pupils, and also on the
achievement in science.

I.Q. test, Creative Thinking Test (T.T.C.T., Figural
and pre-achievement tests were administered.

Unpublished Ph.D. Thesis, M.S. University,
Baroda. 1981.
Various statistical techniques like means, S.D.'s, Correlations and analysis of variance (ANOVA) were applied.

The Findings were as follows:

(1) The difference between the selected strategies for their effectiveness in developing creative thinking and achievement in science of seventh class pupils is significant at 0.01 level of significance.

(2) It was also found that the four strategies of teaching had significantly differential effects on the development of originality and flexibility but the F ratio for the effects of strategies was found to be not significant in the case of fluency.

(3) The St₄ produced significantly high mean scores for achievement of the pupils than all other strategies. St₃ and St₂ produced significantly higher mean scores than St₁ and there was no evidence of significant difference between St₃ and St₂.

(4) Strategy St₄ was more effective in developing creative thinking and its components as compared to all other strategies.

(5) It is observed that the effects of strategies were dependent upon the level of intelligence, sex and creativeness of pupils.

(6) St₃ i.e. dominancy of practical work did not show
any significant superiority over lecture with respect to low intelligence, low creativeness girls.

3.5 CREATIVE THINKING PROGRAMME:

IT'S CORRELATES

Study-11 Improving Children's Creative Problem-solving Ability: The Purdue Creativity Project

In the present study Purdue Creative Thinking Programme (PCTP, Feldhusen, Treffinger and Bahlke, 1970) and the Productive Thinking Programme (PTP), Covington, Crutchfield, Davies and Others 1972) were used with the sample of elementary school children.

Objectives

The specific objectives of the study were as follows:

(1) To evaluate the effectiveness of the PTP and the PCTP under conditions of self-instructional use by pupils, compared with utilization which incorporated active teacher participation.

(2) To compare the effectiveness of the PCTP, in relation

to each other as well as to uninstructed controlled groups. Under two distributions of instructions: Massed (completion of instruction in four weeks) and distributed (completion of instruction in eight weeks).

(3) To compare the effectiveness, in each of the conditions specified above, in classes taught by teachers who were themselves high and low in divergent thinking ability.

(4) To assess the effectiveness of the programmes under the conditions specified in objectives one through three, with respect to several criteria of creative thinking and problem solving.

Sample

Seven hundred ninety three pupils and their teachers participated in the project. The subjects come from 36 fifth grade classrooms in two public school systems, one in northern and one in central Indiana.

Procedures

The TTCI were administered to all teachers to determine their level of divergent thinking ability. On the basis of their composite fluency, flexibility and originality scores the teachers were assigned either to a high group (above the median) or a low group (below the median) two
classes in each group were then randomly assigned to experimental arrangements (PCTP or PTP, 4 weeks or 8 week; Discussion or Non-discussion).

The teacher in discussion groups were asked to participate actively with their pupils in the creativity instruction, and to initiate activities which would provide applications of the instruction to other classroom lessons. They were also given suggestion for bulletin boards, games role playing, other activities which would relate the instructional programme's content to other school situations.

In non-discussion groups the teachers were asked to distribute the creativity material, answer pupils routine questions and supervise their classrooms, but not to discuss specifically the content of the programmes or otherwise make any special attempts to encourage creative thinking among their pupils. Four controlled groups received no special instructions nor were these groups stratified by level of teacher's divergent thinking ability. Therefore, a factorial design (2x2x2x2) with a single control group statistical procedures followed:

Tools

The following tools were administered to all pupils in experimental and controlled classes.

(1) Torrance Testing Creative Thinking. All pupils were
given five sub tests from Form B of the TTCT as a pre-test and five comparable sub tests from Form A as post-tests. Three sub tests involved verbal content and two involved figural content.

(2) The Old Black House Problem: The old Black House, a programmed problem solving task was developed at the Berkeley creativity project and has been used in other studies of effectiveness of the PTP. The children were given as a post-test—a brief story involving a detective in search of an old black house. Scores were derived by using criteria developed by the authors of the test.

(3) Real Life Problems: Two real life problems entitled "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) Other problems: Finally all pupils were also given two verbal problem-solving tasks and the first was a multi students anagram task and second was a word generation task called "Antelopies". Each problem was scored for the number of solutions produced.

Results and Discussion

The results of this study may be summarised as follows:

(1) Both the PCTP and the PTP have been shown the effect
significant enhancement of fifth grade children's
divergent thinking abilities (particularly verbal
abilities).

(2) Both programmes have been shown to be associated
with superior performance by fifth grade pupils, in
comparison with controls, on several criteria of
creative problem solving.

(3) When the programmes are utilized in as short a period
of time as 4 weeks, superior performance seemed to be
associated more frequently with non-discussion and
with teachers rated low divergent thinking.

(4) The PTP, originally designed as a self instructional
programme, appeared to be less influenced by varia-
tions in the rate of presentation of teacher partici-
pation and teacher's level of divergent thinking.
For the PCTP, however, there was some evidence that
as the rate of presentation became slower, the role
of discussion and the positive effects of high
divergent thinking ability in the teacher increased.

Study-12 Creativity as Related to Intelligence,
Academic Achievement and Security-Insecurity
Amiya Kumar Basu¹² Univ. Of Calcutta, Calcutta.

¹² A.K. Basu: Creativity as related to Intelligence,
Academic Achievement and Security, Insecurity,
Unpublished Ph.D. Thesis, Univ. of Calcutta,
Calcutta, 1980.
The paper dealt with two studies conducted separately and was to find out the relationship of creativity with intelligence, academic achievement and security-insecurity. The first study was to estimate the relationship among creativity, intelligence and academic achievement. The other study dealt with the relationship between creativity and security-insecurity. The samples for the first study comprised 200 boys and 200 girls of high school, whose age group ranged from 14 to 17 years. The sample for the second study consisted of 200 boys of the same age group.

Literature and journals published so far on creativity reveal that many attempts have been made in recent years to find out the relationship between creativity and many variables, including personality factors, for example—relation of creativity to intelligence, achievement, values, extroversion-introversion etc.

Attempts to find out the relationship among creativity, intelligence and academic achievement were made by Bennet (1972), Clineetal (1963), Getzel and Jackson (1962), Hasan and Buteher (1966), Medhi (1978), Torrance (1966), Yemahoto (1964) and Several others in past years. Invest of these studies measures of creativity as assessed through Guilford and Torrance type of tests' scores correlated with academic achievement as highly as did intelligence test scores. Edwards and Tayler (1965) found a high intelligence group to be superior to high creative group on both
achievement test and grade point average.

Paramesh's study (1972) was aimed at, to find out the effect of creativity on achievement keeping intelligence constant. He found that creativity had consistently no significant relation to achievement in any of the subjects. Intelligence had turned out to be significant for all performance measures. Thurstone, through his writings in 1950, stated that the creative talent was not the same as intelligence, although there was undoubtedly a positive relationship.


Studies by Torrance, Gurie and Flescher (1967) suggested that particularly the individuals who were the stars at the classroom showed excellent performance on creative and intelligence activities.

From what has been said above, one can draw the conclusions regarding the relationship between creativity and achievement that much depend upon what is measured and in what manner. But there seems to be no studies of creativity in relationship to security-insecurity.

The purpose of the present study was, therefore, to search uniformities existing in relationship among creativity,
intelligence and academic achievement and to find out as to what extent creativity was related to the feeling of security insecurity.

Method

Sample

The study was conducted on two samples. The first sample consisted of 400 high school students of std. X categorising into 200 boys and 200 girls. The subject was chosen from four boys' school and four girls' school respectively by the random sampling technique. The age-group of the boys and girls ranged from 14 to 17 years. On this sample the relationship among creativity, intelligence and academic achievement studied.

The data for studying the relationship between creativity and security-insecurity were collected from the same sample of 200 high school boys which were selected for the first study. Their age ranges from 14 to 17 years. The average was 15.2 years.

Tools


(2) Creativity test designed by N.S. Chauhan and G. Tiwari and adopted by Basu in Bengal. The test measure creative production, fluency, original power, flexibility and ingenious solution of problem.
The total work of all the subjects prescribed by the West Bengal Board of Education for Std. X were collected from the records of annual examination, out of the high schools selected for the study and used as achievement scores for the sample chosen.

Security-insecurity inventory developed by G. Tiwari, adapted by Basu in Bengali.

Procedure

Raven's standard progressive matrices were administered to all Ss individuals with proper instructions to find out the intelligence level of the Ss. Creative test was also given individually following proper instructions thereof. The different parts of the tests in the given time, were asked to Ss to complete it. The academic performance scores of the annual examination for all the Ss selected for the first study were collected from the school records.

The high and low creative groups were found out by the creativity tests which were administered on the 200 high school boys of the first sample. The high group was estimated to be 50 Ss and the low group to be 50 Ss. Security insecurity inventory was then applied to both the groups separately allowing 20 minutes for each subject of the two groups to perform their tasks as this test required 20 minutes as time limit.
Results

The data thus obtained were used for estimating product moment correlation to find out relationship between creativity and intelligence and academic achievement. The obtained correlations and the level of their significant have been shown in table..

The scores derived from the security—insecurity for high and low creative groups were found out. The scores thus obtained were utilised for testing the hypothesis that the high creative children would score significantly high on security—insecurity as compared to the scores obtained by the low creative children.

Discussion

In the present study the correlation between the variables used and recorded were found to be highly positive and statistically significant. The results were on the line with some previously study. Coline etal 1963; Gatzel and Jackson 1959, 1962; Husan and Butcher 1966, Torrance 1966, Yamamoto 1959). In these studies, measures of creativity as assessed through Guilford and Torrance type of test scores correlated with academic achievement as highly as did intelligence test scores. Edwards and Tayler (1965) found a high intelligence group to be superior to high creativity group on both achievement test scores and grade point averages.

The results obtained in the present study were in
contrast in part to Paramesh's findings that creativity had significant relation to Achievement. In all the subjects in the present study the correlation between creativity and achievement was found to be 0.51 being significant at 0.01 level and the relationship between intelligence and academic performance was also obtained to be satisfactorily and statistically significant.

The present findings indicated that the scores on intelligence test and test for creativity used were highly correlated. This was perhaps due to the fact that the test measures in both the areas were tapping more or less the same structure of abilities, otherwise such a high correlation (0.9) could not be achieved. It was also observed in a number of studies that measure of creativity correlated with the measure of intelligence. But such high correlation could not be imagined, if the test creativity was measuring some thing different then mere intelligence. It is true as it was reported by Gatzels and Jakson (1962) that at the higher level of intellectual functioning it is difficult to differentiate between intelligence and creativity, but at lower level creativity does differ from intelligence.

This was further reinforced by the correlation found between creativity and achievement. The type of academic environment in which the Indian children are usually placed today requires a high degree of confirmity in action and convergent thinking. Under this background creativity
measures which basically top divergent thinking should not have such a high correlation with academic performance, as it is found in the present study. One reason for such a high correlation may be due to the subjective factors in scoring which was adopted in the creativity test used in this investigation.

The findings of the present study taken at its face-value indicated that academic performance of secondary students could effectively be predicated on the basis of intelligence as well as creativity measures.

In any way this study highlights certain questions which require probing through further research.

The second study deals with finding out as to what extent creativity is related with the feelings security-insecurity. The result of this study as shown in the table clearly indicates that two groups are significantly different from each other with regard to their performance on security insecurity inventory. This means that the high creativity children score significantly high on security-insecurity inventory as compared to the scores obtained by the low creative children. Hence, this difference leads to a high degree of relationship between creativity and security-insecurity.
3.6 RATIONALE OF THE PRESENT STUDY

The central purpose of education in a democratic society is the development of mental abilities and thinking power of the students. The traditional concept of mental ability has been considerably expanded by modern research findings and if Guilford's concepts of convergent thinking ability - related largely to intelligence and of divergent thinking ability related largely to creativity have same theoretical weight and practical utility. School activity programmes will have to be geared to both convergent and divergent achievements. But it can be seen that as compared to convergent thinking, very little is being done for the development of divergent thinking ability in our schools.

Creative expression is a form of learned behaviour which can be developed by application of appropriate teaching practices and by manipulating environment conditions in the classroom. It is found that the gain to creativity can be achieved within a comparatively shorter time of creative instruction in any school subject area or in school endeavour.

A variety of interrelated factors that enhance or
hinder creative ability imply that an attempt to develop creative ability will be more effective if the teaching method includes the strategies which are designed to create favourable conditions. The consistent and systematic attempts put by the teachers to provide these conclusive conditions during teaching, can improve the quality of thinking of the students.

It is seen that as compared to convergent thinking, very little is being done for the development of divergent thinking ability in school.

The review of the related researches helped the investigator to select the independent variables and a research method pertaining to the problem in hand.