

**A STUDY OF THE EFFECT OF CREATIVITY ENHANCEMENT  
INTERVENTION ON THE CREATIVE POTENTIAL OF  
CLASS IX STUDENTS**

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D E C L A R A T I O N  
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Certified that the dissertation entitled,  
'A Study of the Effect of Creativity Enhancement  
Intervention on the Creative Potential of Class  
IX Students', submitted by Gunamrit Kaur, is in  
partial fulfilment for the degree of Master of  
Philosophy of this University. This dissertation  
has not been submitted for any other degree of  
this University or any other University and is  
her own work.

We recommend that this dissertation be  
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A C K N O W L E D G E M E N T S  
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# C O N T E N T S

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LIST OF TABLES

CHAPTER		PAGE NOS.
I	INTRODUCTION	1 - 10
II	REVIEW OF LITERATURE	11 - 57
	Concept of Creativity	
	Creativity and its related theories.	
	Levels of Creativity	
	Creativity and Measurement	
	Relationship of Creativity to other variables	
	Development of Creative Potential	
	Indian Studies	
III	METHODOLOGY	58 - 92
	Problem Statement	
	Objectives	
	Hypotheses	
	Research Design	
	Sample	

CONTD. -----

Tools employed

Description of Tools

Procedure

Pilot Study

IV                    RESULT AND ANALYSIS                    93 - 157

V                     DISCUSSION                                 158 - 172

VI                    SUMMARY AND CONCLUSIONS             173 - 182

Limitations

Suggestions for future Research

BIBLIOGRAPHY

APPENDICES

\_ \* - \* \_ \* - \*

L I S T     O F     T A B L E S

TABLE NOS.	TITLE OF THE TABLE	PAGE NOS.
4.1	Raw Scores of Students for Composite Creativity on FTC.	97 - 98
4.2	Analysis of variance of pretest and posttest scores.	99
4.3	Analysis of covariance for composite creativity scores.	100
4.4	Raw Scores of Students for verbal creativity on PTC	102 - 103
4.5	Analysis of variance of pretest and posttest scores	104
4.6	Analysis of covariance for verbal creativity scores	106
4.7	Raw scores of students on nonverbal creativity test of PTC	108 - 109
4.8	Analysis of variance of pretest and posttest scores	110
4.9	Analysis of covariance for nonverbal creativity scores	111

CONTD. -----

4.10	Raw scores of students on the fluency component of creativity	114 - 115
4.11	Analysis of variance of pretest and posttest scores	116
4.12	Analysis of covariance for fluency scores	117
4.13	Raw scores of students on verbal fluency	119 - 120
4.14	Analysis of variance of pretest and posttest scores	121
4.15	Analysis of covariance for verbal fluency scores	122
4.16	Raw scores of students on nonverbal fluency	123 - 124
4.17	Analysis of variance of pretest and posttest scores	125
4.18	Analysis of covariance of nonverbal fluency scores	126
4.19	Raw scores of students on flexibility factor	129 - 130
4.20	Analysis of variance of pretest and posttest scores	130

CONTD. -----

4.21	Analysis of covariance for flexibility scores	132
4.22	Raw scores of students on verbal flexibility	134 - 135
4.23	Analysis of variance of pretest and posttest scores	136
4.24	Analysis of covariance for verbal flexibility scores	137
4.25	Raw scores of students on nonverbal flexibility	138 - 139
4.26	Analysis of variance of pretest and posttest scores	140
4.27	Analysis of covariance for nonverbal flexibility scores	141
4.28	Raw scores of students on originality factor	144 - 145
4.29	Analysis of variance of pretest and posttest scores	146
4.30	Analysis of covariance for originality scores	147



CONTD. -----

4.31	Raw scores of students on verbal originality	149 - 150
4.32	Analysis of variance of pretest and posttest scores	151
4.33	Analysis of covariance for verbal originality	152
4.34	Raw scores of students on nonverbal originality	153 -154
4.35	Analysis of variance of pretest and posttest scores	155
4.36	Analysis of covariance for nonverbal originality scores	156

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A B S T R A C T  
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To ascertain the effects of creativity enhancement intervention on the creative potential of students, a sample of 68 male students, studying in Class IX of a Hindi medium Government School of Delhi were assigned randomly to experimental and control groups respectively. A pretest-posttest experimental control group design was used.

To achieve the objectives of the study it was hypothesized that there may be no difference in the composite creativity scores, in the verbal creativity scores and in the nonverbal creativity scores before and after the intervention program and further there may be no difference in the scores of students on the fluency, flexibility and originality factors of creativity before and after the creativity intervention program.

Instructional materials in the form of activities/exercises were specially prepared by

the Researcher as a part of the creativity intervention program in an effort to enhance the creative thinking abilities of the students.

Four subtests of the Passi's test of creativity were used, three of which were verbal and one was nonverbal. All these tests were administered before the start of the intervention program and once again 3 months after the intervention program.

Results indicated that the intervention program was effective in fostering the creative thinking abilities of the students, particularly the verbal creativity of the students. The intervention program was not significantly effective in fostering the nonverbal creative thinking abilities.

Results also imply that the creativity intervention program had a significant positive effect in enhancing the fluency and flexibility factors of creativity, while the originality factor was

not as sensitive to fostering effects. Further, the findings show that the treatment had a significant effect on the enhancement of verbal fluency, flexibility and originality components of creativity, and was not as effective in enhancing the nonverbal fluency, flexibility and originality components of creativity.

The results of the study have thus shown that creative thinking particularly verbal creative thinking can be enhanced in children by devising suitable creativity intervention program.

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⊙ ' As spring

agitates the earth  
to bestow greenery,  
blossoms and gentle breezes on it,

So is man,

shaken and endowed

When he becomes

aware of the

creative force in him'

Johann Mayrhofer

1787 - 1836

CHAPTER - I

I N T R O D U C T I O N

## CHAPTER - I

### I N T R O D U C T I O N

Creative people are essential prerequisite for the development of a society. Creativity is needed in every strata of society, in every walk of life - whether it is a government institution, or a factory; hospital or university.

Creativity is a complex factor which has been studied by numerous Educationists, Researchers and Psychologists. The findings of the research endeavours have led to the identification of a large number of factors which constitute as well as influence creativity.

The recent attempt to define creativity has been by Isaksen and Treffinger (1985) who define creative thinking as 'making and communicating meaningful new connections; thinking of many possibilities; thinking and experiencing in various ways and using different points of view; thinking of new and unusual possibilities and generating, and selecting alternatives'.

However, the concept of creativity remains more or less the same indicating that it is a human resource which can be used in a variety of ways to overcome many existing problems as well as discover new and better methods of living. There are numerous factors which have provided impetus to the growing interest in the field of creativity. The following points have been identified as rationale behind the desire to better understand the concept of creativity.

1. Discover new and better ways to solve problems -

Our world is under stress from pollution, over population, starvation, terrorism and the threat of nuclear war. To cope with these problems of global magnitude and importance, the human race has to utilize every ounce of its creative imagination. There is an urgent need for creative, new, effective solutions to problems in the domains of human endeavour.

2. Development of Society-

Another reason often given for the increased interest in creativity is its role in



the preservation and growth of society (Rogers 1959; Torrance, 1962; Isaksen,1987). As Toynbee (1964) so aptly puts it, 'To give a fair chance to potential creativity is a matter of life and death for any society'. Creativity is a central factor in our ability to continue to adapt to the changing environment (Rogers, 1959). Since social, economic and scientific progress relies upon creativity and innovation, it is crucial for this skill to be developed wherever it is found in society.

3. Important aspect of Mental Health -

Creative behaviour is a necessary aspect of a mentally healthy life (Isaksen,1987; Parnes 1971). Individuals who are able to incorporate creativity into their lives can enjoy the experience of discovering, developing and utilising their many talents. Conversely, individuals who find their creativity suppressed, for one reason or another, may experience

frustration in attempting to maximise their abilities. As Parnes (1971) has noted, 'the person who fails to use his potential may become psychologically unhealthy or mentally ill'. Rogers (1959) has asserted that the primary motivation behind creativity is to enable oneself to fully actualise his or her potential. Furthermore, skills relevant to creativity may also be useful in coping with life's stresses (Torrance,1962)

4. Rapid growth of competition in business and industry.-

Another reason cited (Isaksen,1987; Ackoff & Veragara, 1988) as support for the increased interest in creativity is the growing competition in business and industry. The technological developments of this century are a tribute to man's ingenuity and creativity. However, it is these same technologies which have given rise to global competition. Therefore, in order for today's organisations

to remain competitive it is imperative that they incorporate creativity and innovation into all business functions.

5. Enhancing the Learning process -

Finally, the nature of learning requires the use of skills associated with creativity. Several scholars (Guilford, 1987; Taylor, 1988) have argued that educational programs must provide instruction which explicitly encourage students to develop their latent abilities.

The above analysis of the rationale for the study of creativity glaringly points to the fact that sincere attempts have to be made to foster abilities which are involved in creative thinking. And what better place than schools, is available for this endeavour!

In the same line of thinking the National Policy on Education, 1986 also states, 'Life in the coming

decades is likely to bring new tensions together with unprecedented opportunities. To enable the people to benefit in the new environment will require new designs of human resource development. The coming generations should have the ability to internalize new ideas constantly and creatively. All this implies better education'. It implies an educational system that encourages the student to think for himself, to be creative and to have the courage to examine critically new ideas.

But one of the oft-repeated criticisms of classroom teaching today is that it affords little scope for creative work by the students. It is commonly observed that our system of education is highly institutionalized, rigid and tradition bound. The load of academic studies, the number of text books, the homework and preparation for tests and examinations are a real negation of what education should be. Due attempts have not been made to contribute to the growth of creative talents in schools.

Guilford (1970) provided support for the view that the schools are important environments to foster the deliberate development of creative learning. He states:

'If we look to education to foster development of intellectual skills, the implications of all this should be obvious. If we want to produce skilled problem solvers we should see that individuals encounter the experiences that will exercise the functions in all categories'

This includes divergent thinking abilities in addition to the convergent thinking abilities.

Creative thinking is both a skill and an innate ability. The skills can be developed and the innate abilities can be stimulated and nourished through education and training. Research supports the view that creative learning can be enhanced. (Torrance, 1972; Reese, Parnes, Treffinger & Kaltounis, 1976) Mansfield, Busse & Krepelka, 1978, Rose & Lin 1984).

If development of creative potential is to be made possible through the process of education, it is essential that suitable classroom teaching materials are used. Instructional material have to be developed to provide suitable experiences and manipulation of the environment to the extent possible by students to nurture their creative thinking abilities. Covington (1968) has given two approaches for the development of the instructional material. The traditional one is to teach in such a manner that the student will come to act creatively in a number of different subject matter disciplines. Another contrasting, yet complementary possibility, is to teach for a number of cognitive skills fundamental to all creative thinking and then show the student how such generalised skills can be applied in specific subject matter areas. This latter strategy carries with it the implication of developing instructional materials whose subject matter is the creative thought process itself. It is this approach which was followed by researchers like Parnes, 1967; Feldhusen, Bahlke & Treffinger, 1969; Covington, Crutchfield, Davies & Olton, 1974; Katiyar, Jarial & Sansawal, 1981 & Passi, 1989. and is being explored in the present study also.

Creative behaviours can be encouraged in the teaching of any subject through the use of certain basic creativity enhancement techniques.

Covington (1968) researched the effectiveness of creative learning and provided support for it being a central concern for education.

The nurturing of the creative thinking skills should assume a central place in the curriculum, not a secondary or incidental one. Training of these skills should not be subordinated to the overriding demands of subject matter acquisition, but should be dealt with directly. The process of creative thinking is to be nurtured in its own right and yet in such a manner as to be fully coordinated with the other more traditional, content - centered curricula.

Integration of creative thinking within all curricular areas seems to offer the ultimate challenge to educators.

In the present study an attempt has been made to develop instructional materials as a part of the creativity enhancement program. These include certain basic techniques (elucidated in the Methodology Chapter) which can be used

either exclusively or incorporated in the subject curriculum. These fundamental skills can be adapted to almost any subject matter content at any educational level to increase the chances that they will contribute to the creative development and functioning of the students.

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CHAPTER - II

REVIEW OF LITERATURE

CHAPTER - II

REVIEW OF LITERATURE

This chapter endeavours to integrate the literature pertaining to the topic under study.

Researches in the field of creativity can be widely addressed to four areas of investigation viz.,

- a. Concept of Creativity
- b. Measurement of creative potential
- c. Relationship of creativity to other variables and,
- d. Development of creative potential.

CONCEPT OF CREATIVITY

Creativity is referred to as, 'man's capacity to produce new ideas, insights, inventions, or artistic objects which are accepted as being of social, spiritual, aesthetic, scientific or technological value' (Harre & Lamb, 1986).

This emphasizes novelty and originality in the production of new combinations of familiar patterns, as in poetry or music or reorganisation of concepts and theories in sciences.

However, unconventionality or a lunatics ravings do not come under the category of creativity. The product must be given recognition positively or negatively by people of importance even if they initially reject and do not appreciate the same until later.

Traditionally, creativity was considered a rare and mysterious phenomenon, occurring mainly in a few outstanding geniuses such as Da Vinci, Mozart or Einstein, although it was realized that many others, though, generally more mediocre artists or scientists also produced occasional or minor creative works. The present trend, however, is to see creativity as spread through almost the entire population, though varying in degrees. It is indeed well known and experienced by many that at times a dramatic play of the young child appears as imaginative and creative as a master production from well known creative artists. Indeed creativity may perhaps be even observed in young animals at play or among chimpanzees who, according to Kohler (1925) display inventive thinking or "insight".

Inspite of the importance of creativity for the

individual, society and the nation it is strange to note that no universal definition of creativity is available. There are many definitions, each emphasizing a different facet of creativity.

Morgan (1953) published 25 definitions of creativity as seen in the literature. The definitions emphasize either one or a combination of four aspects - process, person, press and product.

Definition in terms of 'person' refers to the person who creates, i.e. in terms of physiology and temperament including attitudes, habits and values, According to Guilford (1963), "it is a combination of aptitude factor and disposition that enables a person to use his importance in novel ways".

Definition in terms of 'product' refers to creativity expressed in action. According to Israeli (1946) Drevdahl (1956) Stein (1962) and Kavolis (1964), "Creativity is the capacity of the individual by which something new is produced, an idea or an object including a new form or arrangement of old element".

Definition in terms of 'process' lay emphasis in working within the psyche of the creator. Torrance (1962) defined creativity "as a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements and so on, searching for solutions, making guesses or formulating hypotheses and possibly modifying and retesting them and finally communicating the results".

'Press' means the interaction between human beings and their environment. It is the effect of environment that initiates the individual for certain creative activities. Brien et.al (1953) define it as, "the process of manipulating the environment, the environment which results in the production of new ideas, patterns or relationships".

Rogers (1954), definition of creativity includes all the four concepts. According to him, "it is the emergence in action of a novel relational product , growing out of the uniqueness of the individual on the one hand and the materials, events, people or circumstances of his life on the other".

#### Creativity and its related Theories

Several theories have been advanced to describe the

nature of the creative process. These theories vary widely in their scope and methods. Gowan (1972) classified the theories into five groups.

(a) Psychoanalytic approaches

The psychoanalytic view of creativity stems from the extensive work and influence of Sigmund Freud, who was of the viewpoint that, there was very little quantitative difference between the creative process and neurosis, except in the way the creative artist was successful at using unconscious, primary process material to gain personal gratification. Freud (1920) saw a temporary "break" in reality as necessary for the creative artist, although the person would not completely or irrevocably lose contact with reality. For Freud, the individual's creativity originated in conflicts arising from the tension of the conscious, reality bound processes with unsatisfied unconscious biological drives.

Subsequently, many psychoanalysts shifted away from the traditional Freudian view point and

placed the locus of creativity in the 'preconscious' rather than in the 'unconscious'. Kris (1952) emphasized 'regression in the service of the ego', and Kubie (1958) stressed the importance of the 'preconscious' material which can become conscious very easily and under conditions which frequently arise - in the creative process.

Another approach to the study of creativity stemming from that of Freudian tradition was that of Jung's (1928) work on the aesthetic process. The latter made a significant contribution to the study of creativity in reference to the aesthetic process. He pointed out that great works of art cannot be seen solely as the result of personal experiences or cognitive mechanisms but as the transcending of the collective unconscious of the individuals over their limitations, which in turn provides the psychological medium to release creativity. Thus, Jung's collective unconscious could be considered analogous to Freud's primary processes.

(b) Cognitive, Rational and Semantic Approaches:

This group of theories views creativity as

rational, set largely in the cognitive domain, with an emphasis on semantic or verbal concepts or associations. Although there is usually considerable interest in defining phases or stages of the creative process in this group most of these theories also stress the products of creative thinking and problem solving. Early theories were largely concerned with identifying steps or stages in the creative process, such as preparation, incubation, illumination, and verification (Wallas, 1926). However, in the cognitive Rational and semantic theories, several specific approaches appear to be included. These are -

- (i) Creative Problem Solving (eg. Osborn, 1963; Parnes, Noller & Biondi, 1977)
- (ii) Cognitive abilities (eg. Guilford, 1967; Torrance, 1974)
- (iii) Associative theories (eg. Maltzman, 1960; Mednick, 1962; Koestler, 1964)  
and
- (iv) Gestalt theories (eg. Wertheimer, 1945)



(i) Creative Problem Solving -

This approach consists of five steps for creative action which are: fact finding, problem finding, idea finding, solution finding and acceptance finding.

(ii) Cognitive Abilities Approach -

Was put forward by Guilford (1967) and Torrance (1974). Guilford's structure of intellect presents five mental operations.: four of these namely cognition, memory, convergent thinking and evaluation are in one way or another included in prior theoretical models to which he added a fifth dimension that he calls divergent thinking. The operation of divergent thinking as a mental activity, is linked with the creative process. The definition given by Torrance has described the stages of creativity and he had included flexibility, originality and fluency and elaboration.

(iii) Associative Theories (Maltzman, 1960; Mednick, 1962)

The association theorists believe that

creativity resulted from the number and unusualness of associations.

(iv) Gestalt Theories (Wertheimer, 1945)

Emphasized that the structural features of a problem ultimately determined the restructuring process that lead to solution.

(c) Personality and Environmental Approaches -

Many theorists have emphasized the affective nature of creative talent, rather than the cognitive abilities. These theorists are concerned with the personality traits or characteristics of the creative person. Within this group, theoretical concern focussed more on the nature of the person (and differences among people in comparison to highly creative individuals with their less creative peers) and less upon the processes or products of creative thinking and problem solving.

Within this group are theories emphasizing

personality characteristics (eg. Anderson, 1959; Barron, 1972; Mackinnon, 1978) and social and environmental influences (eg. Stein, 1953; Crutchfield 1962; Eisner, 1964) that lead to creativity.

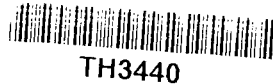
(d) Mental Health/Psychological Growth -

Many approaches to creativity stress human potential for self realization, personal growth and fulfillment. They share with the personality theorists a concern for the person and an affirmative or positive conception of creativity. With the cognitive theorists they share a concern for openness and flexibility - processes in promoting creative behaviour. Theories in this general category include self actualization approaches (eg: Rogers, 1954; Maslow 1959)

(e) Psychedelic Approaches -

Psychedelic derives from the Greek meaning "mind-manifesting",. It is used in this general and neutral sense. These approaches to creativity

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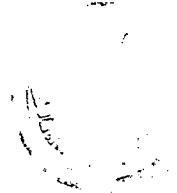
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emphasize the importance of expanding the awareness or consciousness of the mind, helping the person to be more creative by opening vast new horizons of untapped resources and experiences. A fundamental assumption underlying these theories is that most people seldom or never tap the most potent, creative dimensions of the mind, they learn from early childhood to restrict their experiences.

However, extraordinary uses of the mind are considered to be potentially very important to the person. Through such awareness the possibility exists for positive psychological development (Weil, 1972; Houston 1973). Nevertheless, there appears certain disagreement about how alterations of consciousness can and should be attained and how effective and morally sound and efficient are the various methods which are used for these purposes.

Also some (eg. Barron 1969; Harman & Fardiman 1970) have demonstrated the use of chemical drugs to produce changes in consciousness and it is argued that drug inducing alterations could well provide a direct path to creativity.

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### Levels of Creativity

Creativity as any other ability, functions at different levels. Ghiselin (1954) classified creativity into two broad levels: primary and secondary. Primary creativity "alters the universe of meaning itself by introducing in it some new element of meaning or some new order of significance, or more commonly both". Creative action at a lower level, i.e. the secondary level, brings about further development to an established body of knowledge.

Eisner (1964) had described four levels of creativity which included boundary pushing, inventing, boundary breaking and aesthetic organising.

According to Taylor (1971) there are five levels of creativity. Out of these, the first two viz. expressive spontaneity and productive skill were a kind of preparation for creativity and the last three which included inventive ingenuity, innovation, flexibility and emergent creativity were the ones through which creativity generally had expression.

Treffinger (1980) proposed a practical mode for describing three different levels of creative learning,

with consideration of both cognitive and affective dimensions at each level. The three levels were divergent functions, complex thinking and feeling processes and involvement in real challenges.

#### CREATIVITY AND MEASUREMENT

Among the foremost psychologists who contributed a great deal towards the measurement of creativity were Guilford (1967) and Torrance (1966). Generally their measures gave major roles to creative thinking abilities which included 'fluency' or the ability to think about a number of ideas, 'flexibility' or the ability to think about a number of categories of ideas, and 'originality' or the ability to think about unusual and uncommon ideas. They also included in creativity, the concept of 'elaboration' which was the ability to think about the complete details of an idea; and finally creativity, also involved 'evaluation' which was the ability to think critically about an idea.

Torrance (1966) attempted to measure these abilities through the presentation of several complex tasks designed

to trigger the expression of these several abilities. Simultaneously, Guilford (1967) attempted to measure divergent thinking abilities by using a test format which generally required the subject to respond to many a stimuli, each setting out to measure a specific component of the structure of intellect model.

Other tests of Creativity include those developed by Wallach and Kogan (1965), Minnesota Tests of Creative Thinking; sounds and images test of originality etc.

In the Indian context, the first evidence of research in creativity had been mainly in the form of test construction. Mehdi (1973), Passi (1979), Kaul (1974) and Ramachandrarachar (1975) developed tests or batteries of tests to identify and measure creative abilities. These tests developed in India had given the necessary initial impetus to research in this field. The tests of scientific creativity were developed by Jhag (1979) and Shukla (1980).

#### Relationship of Creativity to other Variables

Creativity has been related to a number of variables.

### Creativity and Intelligence

The study of relationship between creativity and intelligence has always remained a focus of attention among the researchers.

The first systematic study that was especially aimed at laying down a clear cut distinction between intelligence and creativity was by Getzels and Jackson (1962). Their study revealed that creativity and intelligence were separate modes of thinking, which results were substantiated nearly two decades later by Joshi & Joshi (1986).

A positive relationship between creativity and Intelligence had also been reported by many (Rawat and Agarwal 1977; Singh, Mathur and Saxena 1977, Patel & Joshi 1978, Qureshi, 1980; Reddy & Reddy, 1983) On the other hand a negative correlation between the two variables was also obtained in certain research studies (eg Mehdi, 1977; Jarial & Sharma, 1980).

Despite many studies relating creativity to Intelligence there has been no consistent trend of positive relationship



between these two factors. High degree of speculation is observed regarding the type of tests used and the nature of sample studied.

It may be felt that creativity of certain kind may be highly related to Intelligence, while creativity in certain areas may not be so highly related to Intelligence, and that some Intelligence is essential for the production of cultural, scientific technological and artistic innovation (Sharma, 1980).

#### Creativity and Personality

Do creative persons possess distinct personality characteristics? Beginning with this assumption at the outset, clear differences in the personality profiles between high and low creativity have been reported by Nair (1975), Bhattacharya (1978) and Muddu (1980).

Paramesh (1970) reported significant difference between high and low creative adolescent boys in body image,

barrier characteristics and also on theoretical and aesthetic values, but no difference in introversion, extraversion and neuroticism was observed.

Nathawat (1977) also reported no difference in high and low creative adolescent boys in insecurity - security feelings, neuroticism as well as certain neurotic manifestations, but reported significant difference in ego strength, body image, penetration characteristics, etc.

Srivastava (1982) reported a positive relationship between the scores of creativity and those of different personality factors.,

As regards the relationship between creativity and adjustment, Nair (1975) found differences in adjustment variables between creative and non-creative high school students.

No significant differences in home, health, social emotional and school adjustment between high and low

creative adolescent boys were reported by Nathawat (1977).

Singh (1979) on the other hand reported a positive and significant relationship between creativity and total social and educational adjustment among school students.

Gupta (1981) recently reported that students with high and average adjustment tended to be more creative.

#### Creativity and Demographic Variables

In a number of studies efforts have been made to correlate creativity with a variety of demographic variables. For instance socio-economic status of families has been correlated with creativity in a couple of studies with negative results (Rawat & Agarwal, 1977; Seetharam & Vedanayagam, 1979.)

Jarial (1979), Asghar (1987) reported that ~~that~~ higher socio-economic status was related to higher level of creativity.

Ahmed and Joshi (1977) found that subjects from a

disadvantaged home background scored poorly on a creativity test as compared to subjects from an advantaged home provided that the school was also educationally disadvantaged. In advantaged schools this difference was nonsignificant.

Tentatively, it seems reasonable to infer from the data that socio-economic condition may be relevant to the growth of creativity not directly but as an indirect mediator introducing certain elements in one's life which might prove congenial or detrimental for creativity.

A nonsignificant relationship has been reported for the relationship between creativity and sex in certain studies (Raina, 1971, Gakhar 1974, Gupta, 1979; Dharmangadam, 1981; Pandey and Pandey, 1984 & Asghar, 1987).

On the other hand, Rawat and Agarwal (1977) had reported that upto the age of 13 years, boys scored higher on creativity than girls but after 13 years the relationship was reversed.

Dharmangadan (1981) found that with growing age creativity increased except in figural originality and elaboration.

Bharadwaj (1985) reported that age promotes flexibility in males but demotes it in females. The findings from the above research studies do not appear to lead to any specific relationship between Creativity and demographic factors such as age and sex.

#### Creativity and Academic Achievement

Studies relating creativity and academic achievement have shown that those who scored higher on creativity also scored higher marks than non-creative groups irrespective of sex factor. (Asha 1980)

Srivastava and Jha (1977) found that science students scored significantly higher on creativity as compared to students of commerce.

However, these findings are somewhat inconclusive and ungeneralizable because the sampling technique, methodology

and the procedures vary a great deal from one study to another and also confined to a very limited isolated group.

### Development of Creative Potential

Since J.P. Guilford presented his presidential address on creativity at the American Psychological Association convention in the year 1950, teaching and investigating creativity in schools have become increasingly more common than earlier. For the past 40 years educators and psychologists have developed various techniques and instructional materials to facilitate creative thinking.

The following section presents studies related to instructional materials.

Studies on fostering creativity have been categorized according to the types of training program which in general include the following :

1. Productive Thinking Program
2. Purdue Creative Thinking Program

3. Creative Problem Solving Problem
4. Other Creativity Training materials
5. Other Programs using special techniques.

These programs are being described below:

1. The Productive Thinking Program (PTP)

Developed by Covington and Crutchfield in 1965 -  
The PTP consists of 16 programmed instructional  
booklets designed to develop general creative problem -  
solving abilities and favourable attitudes towards  
problem solving. It is presented in a mystery story  
format with students participating in solving each case.  
The PTP was written primarily for 5th & 6th grade  
students.

The first evidence of the program's effectiveness  
was presented by the developers in 1965 (Covington and  
Crutchfield, 1965), using a preliminary version of the  
PTP. In all 195 subjects were taken up for this study.  
The instructed group performed significantly better than  
the control group on each of the posttest measures which

included number of problem-clarifying questions asked, number and quality of ideas generated and number of solutions achieved and various tests of divergent thinking. On a follow-up test five months later, it was found that the instructed group maintained its superior scores. Another study on Creativity by the same researchers indicated marked superiority in the instructed group, but also showed that the effects were stronger at the fifth grade level than at the sixth.

Ripple and Dacey (1967) reported less supportive results for PTP adapted for eighth graders. They found no significant difference between instructed and control groups on imagination, fluency, flexibility and originality. Twenty five students from each group were then asked to solve a realistic problem. No significant results were obtained, and the authors concluded that their study gave limited support for nonspecific transfer effects from the PTP to real problem.



Treffinger and Ripple (1969) studied the materials on a completely self-instructional basis, among pupils in grades four through seven. At all grade levels, there were no significant training effects with respect to verbal creativity or arithmetic problem solving. For general problem-solving measures, there was no significant difference, between instructed and control group pupils in grades six and seven. In grades four and five, however, instructed pupils' scores were significantly higher than those of the controls, but this was again limited to only three of 20 comparisons. On the inventory of problem-solving attitudes, at all fourth grade levels, instructed pupils' scores were significantly higher than controls.

In a project at the Berkeley Creativity Project, Wardrop et al (1969) studied 704 fifth grade pupils. Instructed pupils surpassed controls on 30 of 40 posttest measures.

Research on effectiveness of the PTP upto 1971

was reviewed and systematically interpreted by Treffinger and Ripple (1971). They identified three general variables which influenced results concerning the program's effectiveness.

1. The conditions under which the instructional materials are administered, including time taken and availability of supplementary materials.
2. The self-instructional utilization of the materials, or amount of teacher involvement.
3. The criteria used to evaluate the effectiveness of the materials, differing emphasis on product or process and degree of similarity between training and evaluation materials.

A study by Sporburg (1971) hypothesized that instruction with the PTP would increase convergent and divergent

thinking abilities and that there would be a direct relationship between a change in one and change in the other. These hypotheses were not supported.

Schuler's study (1974) provided some limited support for the effectiveness of the PTP.

Gold and Houtz (1984) used a modified version of the PTP with educable mentally retarded students aged 10-12 years. They administered one verbal and one figural subtest of the Torrance tests of creative thinking (TTCT), to sixty experimental and sixty control subjects. With pretest, posttest and later four week follow up. Analysis of covariance indicated that the experimental students who used the PTP outperformed the controls on the posttest and the retention test.

There is a newer edition of the PTP (Covington, Crutchfield, Davies and Olton, 1972) containing 15 lessons to be used once a week.

A meta-analysis conducted by Rose and Lin (1984)

covering five studies on PTP found that its greatest effects on the TTCT were on figural fluency, and originality, but that effect sizes were small.

2. The Purdue Creative Thinking Program (PCTP)-

This program (Feldhusen et al, 1969) for students in the third, fourth, fifth and sixth grade level, was designed to foster the divergent thinking abilities of verbal and figural fluency, flexibility, originality and elaboration. It consists of 28 audiotapes with accompanying printed exercises. The first part of tape, contains specific suggestions about creative thinking and stresses its value. A historical story about a famous American pioneer follows. Each tape is accompanied by a printed exercise providing practice in divergent thinking skills.

The first research study with the PCTP (Feldhusen, Bahlke and Treffinger, 1969) involved

265 children in the third, fourth and fifth grade children. The results indicated that the PCTP was effective in increasing children's creative thinking abilities on verbal and non-verbal tests of originality given at the end of instruction, children who received the creativity instruction scored higher than children who did not get instruction. The programs were most effective in fifth grade, where children who were instructed in creativity had higher mean scores on originality, verbal fluency and nonverbal elaboration. No significant differences were found between the scores of boys and girls. Also, children in the experimental group scored significantly higher than children in the control group in language achievement.

In a second study (Feldhusen, Treffinger and Bahlke, 1970) the components of the PCPT (presentation, stories and printed exercises) were evaluated alone and in combination. The results were

extremely complex, with eight of nine post-test variables yielding significant effects of treatment by grade interactions. In general, students receiving the various components or combinations of components of the program tended to perform better than control subjects. However, no component or combination of components was uniformly effective at all three grade levels or for all outcome variables. The treatments involving the printed exercises, alone or in combination, were most effective, but the exercises were accompanied by written reinforcement for fluency and elaboration. Treatment conditions involving the stories also tended to be effective. The presentations were the least effective component of the program.

A follow up evaluation~~of~~ of this study was reported by Speedie, Treffinger and Feldhusen (1971). The treatment effects reported earlier tended not to persist after seven months.

Another study (Pitts, 1975) was concerned with the effects of PCTP, on creative thinking abilities of emotionally disturbed children. Although research was conducted with a very small sample, the experimental group made significantly higher total and verbal gains than the control group and also gained more on the figural tests.

Alencar, Feldhusen & Widlack (1976) conducted an evaluation study involving 578 fourth and fifth graders from schools in Brazil. Two experimental groups, one with reinforcement of the pupils performance on the creative exercises and one with no reinforcement. Results showed significant differences on all creativity dimensions for at least two subtests of a translation of the PCTP, with the experimental groups demonstrating more creativity. Significant differences were also found in the comparison of the two experimental groups. In all instances, the group which had not been

reinforced scored higher than the group which had received reinforcement.

A study was conducted with gifted and regular students (Huber, 1979) Treatment groups gained significantly more than the control groups in verbal fluency and originality. However, the gifted students performed no better than regular students.

Gordon (1980) found no significant effect of the PCTP on the creative thinking skills of fluency, flexibility, and originality of 4th grade students.

Two studies by Jabew (1985) focused on learning disabled children and the effect of training with the PCTP on their creative thinking on figural subtests. The results showed significant gains for experimentals over controls on figural flexibility and originality.



Shivley et al (1972) evaluated both the Purdue creative thinking program (PCTP) and the Productive Thinking Program (PTP). In covariance analysis, groups trained with PCTP were often significantly lower than groups trained with the PTP. Similar results were obtained by Treffinger, Speedie & Bruner (1974).

A metanalysis of creativity training programs (1984) found that in studies where TTCT were used as posttests, the PCTP had its greatest effects on figural fluency, and flexibility. They found that the PCTP had more impact than the PTP.

### 3. The Creative Problem Solving Program

Has been developed by Parnes on the basis of techniques given by Alex Osborn (1963). Brainstorming is the primary technique used in this program. Considerable support was obtained for the effectiveness of brainstorming procedures on an unusual uses

test for college students (Parnes & Meadow, 1959)  
Similar results have been obtained in other  
research studies. (Rees, Parnes, Treffinger &  
Kaltsounis, 1976).

Other studies also support, for the most  
part, the effectiveness of the program with  
graduate and professional students (Biles 1976),  
with foreign language student teachers (Kealey  
1977) with students of school administration  
(Shean 1977) and with business professionals  
(Fontenot, Catford 1988).

The Rose and Lin Meta-analysis (1984)  
found the CPS approach to have greater impact  
on TTCT scores than any other type of creativity  
training.

4. Other Creativity Training Materials

Myers-Torrance Workbooks - Myers and

Torrance (1964, 1965, 1966) have developed a set of workbooks designed to foster creativity in elementary school children. The workbooks provide practice in activities requiring perceptual and cognitive abilities presumed to underlie creativity.

Woodcliffe (1970) found evidence for effectiveness of the booklet. 'Invitations to thinking and doing', on fifth grade children, but only when it was used in combination with inservice sessions with teachers.

A study using the workbooks with trainable mentally retarded children was reported by Cherry (1973). A group of subjects using the workbooks showed significant gains in verbal divergent thinking.

However, research on these materials has not been soundly designed (Mansfield, Busse & Krepelka, 1978).

### Khatena's Training Method

Khatena's (1970) training program provides instruction and practice in five creative thinking strategies - breaking away from the obvious and commonplace, transposition, analogy, restructuring, and synthesis. Khatena has presented some evidence for the effectiveness of his training materials with both children and adults (1971).

#### 5. Other Programs Using Special Techniques

Shackel and Lawrence (1969) achieved success with a program designed to enhance verbal divergent thinking abilities.

Synectics, a method often used in industry, employs a variety of techniques to facilitate two basic processes: making the strange familiar and making the familiar strange. Korth (1973) achieved limited success with this technique

while using it on college students.

Griffith's (1988) study clearly demonstrated a significant improvement effect on creative thinking of undergraduate students, resulting from synectics training.

Goor and Rapaport (1977) reported promising results for a set of creativity games used with disadvantaged sixth and seventh grade students.

Boutte (1980) studied the effects of cognitive behaviour modification on enhancing creativity of elementary children. Results show that it is an effective procedure for enhancing elaboration.

Fultz (1981) achieved success in designing a special program for enhancing creative thinking skills of elementary school children.

Results of Johnson's study (1983) indicated no significant differences on the test scores

between the experimental and control groups after the completion of a program to enrich creative thinking abilities of elementary school students.

Albano (1987) studied the effect of training which emphasized on 'core' thinking processes of adults. The training was successful in improving both figural and verbal expression of creativity.

#### INDIAN STUDIES

Indian researches regarding the development of the creative potential have been categorized under the following heads -

1. Special Programs for developing Creativity.
2. Special techniques of developing creativity.
3. Studies at Institutional level.

#### Special Programs for developing Creativity

In order to enhance the creativity levels of the

students, a few programs have been developed by the Indian researchers and their effectiveness has also been tried.

Jarial (1979, 1981) prepared a program for developing verbal and nonverbal creative thinking abilities among the students of IX grade. Both the forms of the program (verbal and nonverbal) included Twenty Five lessons each. Each exercise comprised of 2 to 6 items. The items pertaining to the verbal forms of program has the content from the immediate environment of the student i.e. home and school. The nonverbal form of program utilized the geometrical figures such as points, triangles, squares etc and sketches as its content. The results of the study indicated a significant effect of the program in developing the different components of verbal and nonverbal creativity (fluency, flexibility, originality and composite creativity)

Bhaskara (1988) prepared a program for developing creativity among VI grade students. This program was based upon the exercises providing training to the

children in creativity through puzzles, riddles, consequences, creative problem solving, mystery plots, story writing, poem writing and construction of riddles. The program proved significantly effective in developing the mean creativity scores of the students.

Veeraraghavan and Samal's (1989) research study attempted to ascertain whether a structured creativity training program would enhance creativity in children. Durnin's structured creativity enhancement training consisting of eleven categories which included exemplification, problem solving, problem generation, internal search, external search, verification of statements, generation of statements about a system Application, modelling, construction of discovery of a system, and unexpected and unusual productions, was used for this purpose. Results showed that the program significantly enhanced Creativity in the students.

#### Special Techniques of Developing Creativity

Chatterjee and Mitra (1976) conducted a study to find out the effectiveness of brainstorming on the



generation of ideas. Undergraduate students in the age group 17-18 years were given training in brainstorming. It was observed that this technique proved significantly effective in increasing the quality as well as the quantity of ideas.

Gupta (1977) attempted to compare the effect of teaching physics to X grade students through brainstorming technique and through traditional method of teaching on the creativity of the students. It was observed that the group taught through the brainstorming technique obtained higher mean scores only on fluency factor of seeing problems test, but achieved lower mean scores on fluency factor of the consequences test of Passi's Test of Creativity than the traditionally taught group.

Nirpharake (1977) designed his study to develop an integrated program of creativity training based upon the four vital areas of creativity viz training in cognition or perception, training in evaluation and appreciation and training in creative problem solving. It was observed that all the four strategies, as well as their

combination proved significantly effective in developing the scores of class VIII students on the criterion test.

Pillay (1978) conducted a study to find out the effect of the 'creative teaching method' (combination of brainstorming, morphological analysis and traditional method) upon the general creative thinking abilities and creative thinking abilities in Geography of VIII grade students. Results showed that the creative teaching method did not produce differential effect on the general creative thinking abilities of students on Pass's test as compared to the traditional teaching method. Thus this study showed that the treatment to the students in brainstorming and related techniques did not help significantly in the development of verbal creative thinking abilities.

Deshmukh (1979) tried to find the effect of brainstorming and role playing technique in developing the creative thinking abilities of grade VIII students. Results indicated that the technique of brainstorming

proved significantly effective in developing students scores on various components of verbal and figural measures of creativity as well as on composite creativity, whereas the technique of role playing and traditional methods of teaching did not help in the development of creativity. Further the gains in students' creativity scores were not found to be effected by the variation in levels of intelligence.

Sansanwal, Sathe and Jarial 1980 investigated the effects of transcendental meditation on the verbal creative thinking abilities of IX grade female students of 16 to 19 years. It was observed that the fluency and originality components of creativity improved significantly after the practice in T.M. for five months, whereas it took nine months to improve the flexibility component, of verbal creativity, significantly.

A study by DEPC&G, NCERT reported similar results (1980).

D'limia (1981) applied the technique of brainstorming for developing creative thinking abilities among the children through the teachers. Although no standard-

ized tools were used for assessing the children's responses yet it was concluded that training in brainstorming helped the children significantly to think more original and divergent ideas.

Sreelatha & George (1981) studied the effect of creative teaching in Biology based on Guilford's structure of intellect. Only 12 adolescents of class IX were studied. Results indicate the effectiveness of creative teaching.

#### Studies at Institutional Level

A few institutions in India have taken up institution level projects to develop creative thinking abilities of their students.

Bal Bhawan has initiated research in creative methodology ,programs and activities.

Passi (1989) has worked on developing creative thinking **skills in** teachers through an eclectic approach. The enhancement program consists of a

number of activities which include developing the technique brainstorming, fluency, flexibility, originality, elaboration, persistency; hypothesizing, challenging assumptions, observation, seeing problems, developing alternate perspectives, substitution, imagery and visualization.

The present study is based on the work done by Passi (1989).

Recently Veeraraghavan (1990) has studied Bal Bhavan's contribution towards enhancement of creativity in children. Results indicate that the experimental group had shown significant percentage increase in their creativity scores after Bal Bhavan intervention of two months period, on the other hand, the control group did not shown any increase in their creativity scores after two months interval.

### Overview

The review of research on creativity instructional

materials indicate clearly that it is possible, through direct instructional efforts to effect significant gains in students creative thinking and problem-solving abilities, particularly as measured by divergent thinking tests (Parnes and Brunelle, 1967, Torrance, 1972 Passi and Jarial, 1983; Feldhusen and Clinkenbeard, 1986). Though the effects have been somewhat inconsistent, these positive effects have been established with a variety of different instructional programs, in several subject or content areas and among students varying widely in age and ability.

Criticisms of these reviews, and the basic assumptions of creativity training and assessment have been made (Cronbach 1970, Kogan & Pankove, 1974). Mansfield, Busse and Krepelka (1978) reviewed creativity training programs and found them to be relatively ineffective. The critics raise questions about research methodology, test validity and the general working construct of creativity.

Tannenbaum (1983) stated that it has not been

conclusively demonstrated that divergent thinking is equivalent to creative thinking or that scores on divergent thinking tests are good predictors of adult creativity. In addition, creativity training materials often involve divergent thinking activities, so that evaluating materials with divergent thinking tests becomes a case of "teaching to the test". Gallagher (1985) further noted that scoring better on a posttest than a pretest may be more a function of having learned what is wanted on the test, rather than an indication of increased creativity. Given these limitations, however, both Gallagher and Tannebaum remain positive about the use of creativity training materials. Gallagher points out that even if long term effects cannot be clearly demonstrated, the materials should be used for their promotion of open-ended activities, good attitudes about creativity and willingness to take risks and try out new ideas.

In the Indian context, only a few procedures to enhance creativity have been tried so far (Passi & Jarial, 1983). 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 development procedure.

Creativity is a complex concept involving skills, motivation and attitudes which should be fostered in a full-time climate of acceptance and encouragement. No one method can be considered as the sole way to increase creativity thinking.

Since, the review of literature in the area of creativity indicates a need to examine the effectiveness of instructional materials in the enhancement of creative potential of children in the Indian context, the present study aims to develop a creativity enhancement program and investigate its efficacy.

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C H A P T E R - I I I

M E T H O D O L O G Y

## CHAPTER - III

### METHODOLOGY

Research evidence in the area of creativity has pointed out a clear possibility of enhancing creative thinking abilities (Felhusen & Clinkenbeard, 1936; Mansfield, Busse & Krepelka, 1978; Passi & Jarial, 1981; Parnes, 1967; Torrance, 1972).

In the international perspective various methods and materials for training creativity have been developed and some of them have been empirically tested<sup>1</sup> also. These procedures include special programs for developing creativity (Productive Thinking program; the Purdue creative thinking program; The Parnes Program; Myers - Torrance Workbooks; Khatenas training materials) the techniques of creative development (Brainstorming, synectics, Attribute listing, Morphological analysis, role playing) and other procedures involving transcendental meditation, training in creative appreciation, creative writing etc. These procedures have been developed in foreign cultures and hence seem to have a culture bias.

Perusal of relevant literature reveals a paucity of research in creativity training in the Indian context .

(Buch, 1986; Tiwari & Pal, 1983). The two major lacunae that the review of literature has highlighted are, firstly the dearth of the availability of instructional materials which could prove helpful in enhancing the creative abilities of students and secondly very few studies (for example: Veeraraghawan, 1981; Veeraraghawan&Samal, 1989) are available which investigate the effectiveness of creativity training.

In the present study an attempt is made to fill this lacunae in research by developing a creativity intervention program and to investigate the efficacy of the program in enhancing the creativity of students.

#### PROBLEM STATEMENT

To study the effect of creativity enhancement intervention on the creative potential of class IX students.

#### OBJECTIVES

1. To assay the efficacy of creativity intervention program in enhancing the creative potential of class IX students.

2. To develop instructional materials to be included in the intervention program of creativity training.
3. To study the differential effects of creativity training on different factors of creativity viz. fluency, flexibility and originality .

#### HYPOTHESES

The following hypotheses have been formulated -

1. There may be no difference in the composite creativity scores of students before and after the intervention program.
2. There may be no difference in the verbal creativity scores of students before and after the intervention program.
3. There may be no difference in the non-verbal creativity scores of students

before and after the intervention program.

4. There may be no difference in the scores of the students on the fluency factor of creativity before and after the intervention program.
5. There may be no difference in the scores of the students on the flexibility factor of creativity before and after the intervention program.
6. There may be no difference in the scores of the students on the originality factor of creativity before and after the intervention program.

#### RESEARCH DESIGN

The pre-test post-test experimental - control group design was employed. The research design is given as follows -

$$R \frac{X}{\sim X} \frac{Y}{Y} \begin{matrix} \text{(Experimental)} \\ \text{(Control)} \end{matrix}$$

The independent variables were creativity enhancement intervention or no intervention. The dependent variables were fluency, flexibility, originality and composite creativity scores including verbal and non-verbal scores on the Passi's test of creativity.

#### SAMPLE

In an ideal situation all factors which contribute or are likely to influence the outcome of a study should be controlled. Since the human organism in his complex speciality is evasive, one can never hope to fathom all the variables, let alone control them. Therefore pragmatically there is no ideal situation where the study of human individual is concerned. However to eliminate the effect of possible influential variables, one can choose subjects so that they are as homogenous as possible.

The sample of the present study consisted of 68 male students studying in class IX of a Hindi medium Government school of Delhi. The most important factor which led the researcher to conduct this study in this group was the relative homogeneity with regard to the set up and facilities available to the students at home and in school. The sample was homogeneous in the sense that all the students had equal opportunity for discipline, interpersonal relations, co-curricular activities, scholastic environment, aesthetic and physical amenities available in the school. The students come from the same locality since admission to the Government schools is area wise and hence are also homogeneous in their socio-economic background.

Of these 68 students, 34 students were assigned randomly to the experimental group and the remaining 34 students were assigned to the control group. (For obtaining a random assignment every alternate student on the school rolls was assigned to each of the two groups) The age of these students ranged from 13 years to 17 years.

## TOOLS EMPLOYED

In order to elicit information relevant to the problem at hand, the following tools were employed -

### 1. Passi's Test of Creativity (Hindi Version)

Consisting of four subtests (3 verbal and 1 non-verbal) were administered to the sample under study to assess the creativity potential including fluency, flexibility, originality and composite creativity of the experimental and the control group. It was also used as an indicator of the efficacy of the intervention program for the experimental group.

### 2. Creativity Enhancement Program

The instructional material to be included in the creativity enhancement program was developed on the basis of Passi's (1989) work on enhancing creativity of teachers. It will be



given in detail in the following section.

#### DESCRIPTION OF THE TOOLS

##### 1. Passi's tests of creativity (PTC)

The operational definition of creativity as given by Passi is as follows:

"Creativity is a multi-dimensional (verbal and non verbal)'attribute differentially' distributed among people and includes chiefly the factors of seeing problems, fluency, flexibility originality, inquisitiveness and persistency".

#### GENERAL DESCRIPTION

The PTC (both in English and Hindi) are developed for the purpose of measuring creativity in school children. In all, 6 tests are included in the test battery viz.,

- (i) The Seeing Problems Test
- (ii) The Unusual Uses Test

- (iii) The Consequences Test
- (iv) The Test of Inquisitiveness
- (v) The Square Puzzle Test
- (vi) The Block Test of Creativity

Of these, the three tests consisting of verbal tasks viz, the seeing problems test, the unusual uses test and the consequences test were utilized and one test consisting of nonverbal task viz the Blocks Test of Creativity was utilized. In all four tests of the battery were utilized for the present investigation. Instructions for each test are specifically mentioned in reusable instruction booklets (Appendix A) and separate answer booklets for responses are available (Appendix B)

A brief and specific outline of the four tests utilized is given as follows:

(i) The Seeing Problems Test

It is a verbal and an individual and group administered test. The test is proposed to measure the ability to comprehend problems concerning the working of simple and handy articles of common use.

It is designed to measure a factor of sensitivity to problems which is a component

dimension of creativity as described by Guilford. This test includes four items viz. shoes, pen, chair and post-card. The maximum time limit for the test is kept eight minutes so that two minutes could be devoted to each of the items.

(ii) The Unusual Uses Tests :

It is a verbal and an individual and group administered test. This test includes the names of things which could be used for numerous purposes . It includes only those items which have proximity with the psychological and physical environment of the subjects. This test includes two items viz Piece of cloth and Bottle. The subjects are expected to write down as many interesting and unusual responses to each stimulus item as they can. The maximum time limit for the test is kept eight minutes so that four minutes could be devoted to each of the items.

(iii) The Consequences Test

It is a verbal and an individually and group administered test. This test includes 4 items viz "If human beings start flying like birds", "If all houses start flying", "If all people become mad", and "If all females become males". The maximum time limit for the test is kept eight minutes so that two minutes could be devoted to each of the items

(iv) The Block Tests of Creativity

It is a non-verbal and an individually administered test. This test is a performance test.

The test consists of nineteen identical cubes (1"x1"x1") and twelve diagonally cut semicubes (cut from six cubes of 1"x1"x1" dimensions). The material provided two types of block and three types of surfaces viz. squares,

rectangles and right angled triangles. The six surfaces of the cubes are painted in red (top), blue (bottom), yellow (face), green (back), white (left side), black (right side). The twelve diagonally cut semicubes have in all twenty-four right angled triangular surfaces, twenty four squared surfaces, and twelve rectangular surfaces. These twelve semicubes are so cut that the four triangular faces of each colour can be obtained. The rectangular faces obtained as a result of cutting the cubes diagonally are painted brown colour. In this way, the test material employed a colour scheme consisting of seven different colours. The subjects have the option of using two types of blocks, three types of surface and seven types of colours in different combinations simultaneously. Besides this, a 10"x10" woodenboard covered with a white paper is also provided to be

used as a base for assembling the blocks to make designs as structures.

The subjects have to produce as many interesting and unusual designs as can be possible in ten minutes. They are further required to write down the headings (titles) of designs. While students are busy in constructing designs the investigator is simultaneously drawing the figures of these designs so that this record may be used for scoring and analysis of responses at a later stage.

The Passi's test of creativity was standardized on a sample of class IX, X and XI students. The test-retest reliability coefficients for all the tests in the battery with a time gap of fortnight between two administrations, ranged from 0.68 to 0.97, with a median value of 0.83. The split-half reliability coefficients for the verbal tests - the seeing problems test, the unusual uses test and the consequences test were 0.88, 0.51 and 0.80 respectively. The tests were validated against an external criterion viz. the

things done on your own check-list' which was an adaptation of Torrance (1962) check-list. This battery of tests had higher concurrent validity coefficients. Against the criterion measures of the check-list, they ranged from 0.43 to 0.95 with a median value of 0.60.

The coefficients of discriminant validity against the criterion of non-verbal intelligence, verbal intelligence and scholastic achievement ranged from -0.07 to 0.81.

#### SCORING

The responses to the tests of the PTC are of divergent nature. It is not possible to employ ordinary stencil scoring system because the content and nature of responses are not known in advance. The detailed scoring procedure for each test of PTC is given in the manual by the author. The Passi test of creativity provides 15 different types of variables related to creativity. These are seeing problems (SP), Unusual Uses Fluency (UF), Unusual Uses flexibility (UX), Unusual uses originality (UO), Unusual uses creativity (UC), Consequences fluency (CF), Consequences originality (CO), consequences creativity (CC), Inquisitiveness (INQ) Persistency (PER),

Blocks fluency (BF), Blocks flexibility (BX), Blocks originality (BO), Blocks Creativity (BC) and Total creativity (CY). For the present purposes two variables viz. Inquisitiveness (INQ) and Persistency (PER) will not be considered and the rest of the variables will be scored.

#### Creativity Intervention Program

The instructional material that have been included in the creativity intervention program aim to help students develop creative thinking skills through certain activities. The enhancement program comprises of ten activities. Each activity had four phases. These are - description, demonstration, practice and problem exercise. The detailed activities included in the program are given in the following section :

#### ACTIVITY - I

#### BRAINSTORMING

Is a group of problem - solving technique that involves the spontaneous contribution of ideas from all



the members of the group.

### OBJECTIVE

To teach the technique of brainstorming focussing especially on withholding evaluation, free wheeling, quantity of ideas generated and hitch hiking i.e. combining, adapting and building on ideas to create new ideas.

### MAIN STEPS

- (a) Warming up
- (b) awareness of the four ground rules of brainstorming i.e. judgement (no), quantity (yes), combination (yes) and wildness (yes)

### PROCEDURE

During brainstorming each student was to say his ideas aloud. Each idea was written on paper by the investigator.

### DEMONSTRATION

The specific activity included in this phase was -"What would happen if our schools had wheels"?

### PRACTICE

The students practised the brainstorming technique with the exercise "How can teachers be less boring in classrooms?".

The problems exercise was as follows :

"What would happen if man could become invisible at will?"

### ACTIVITY - II

#### FLUENCY

Is the ability to generate many ideas in a given period of time.

#### OBJECTIVES

- (a) To conceive many different relationships between objects.
- (b) To be unusually facile with words and
- (c) To generate a large number/quantity of ideas.

#### MAIN STEPS

- (a) Follow the four brainstorming principles

- (b) Generate many ideas/words in a given period of time.

PROCEDURE

To encourage fluency the students were given a 'stem' and asked to generate many ideas/words.

DEMONSTRATION

The activity included here was -  
"How many things can you think of that remind you of the summer season?"

PRACTICE

"How many red things can you think of?"

PROBLEM EXERCISE

What do you think of when you think of the concept of school?

ACTIVITY - III

FLEXIBILITY

Is the ability to alter one's line of thinking to allow for change.

OBJECTIVE

- (a) To group ideas into categories
- (b) To increase flexibility by expanding thinking to include ideas from a variety of categories.

MAIN STEPS

- (a) Practice four guidelines of brainstorming
- (b) Change the direction of thinking without instructions encouragement or a specific need.

PROCEDURE

The students were given the exercises in the different phases.

DEMONSTRATION

"What would happen if man does not have any need for food?"

PRACTICE

List all the possible food items that you can think of.

PROBLEM EXERCISE

"What would happen if the language of birds and animals could be understood by man?"

ACTIVITY - IV

ORIGINALITY

Is the ability to generate novel ideas.

OBJECTIVE

- (a) to be original and novel in their thinking
- (b) to create ideas or products that are unique

MAIN STEPS

- (a) take a common object
- (b) ask for unusual uses

PROCEDURE

The students were asked to write unusual responses for the given exercises.

DEMONSTRATION

" What are the unusual uses of a piece of stone?"

PRACTICE

" What are the unusual uses of a wooden stick?"

PROBLEM EXERCISE

" What are the unusual uses of newspaper?"

ACTIVITY - V

HYPOTHESIZING

Is the ability to put forward an idea or a suggestion for reasoning or explanation.

OBJECTIVE

- (a) to develop productive thinking skills

MAIN STEPS

- (a) to examine any given event/situation
- (b) Imagine what had happened
- (c) Find reasons for the guess

PROCEDURE

The students were asked to respond to the given exercises.

DEMONSTRATION

'While standing near the light post in the night the child saw a big shadow, much bigger than his height, Guess the reason for his getting frightened by the shadow.'

PRACTICE

'Far off in the fields you see an unusual looking shining object. Hypothesize about the object.'

PROBLEM EXERCISE

'You see a big crowd collected near your neighbour's house. Imagine what would have happened that resulted in the crowd gathering.'

ACTIVITY - VI

CHALLENGING ASSUMPTIONS

Means developing critical analysis of the very

basis of ideas/actions. It employs progressive search through 'why' method.

### OBJECTIVE

To enable the students to question when one thinks that one knows the answer.

### MAIN STEPS

- (a) Take a situation/fact/event.
- (b) Ask 'why' about (a)
- (c) Accept answer (b) and again ask 'why'?
- (d) Repeat steps a-c till a 'no answer situation' is confronted.

### PROCEDURE

The students were asked to respond to the given exercises.

### DEMONSTRATION

"Why are class boards black?"

### PRACTICE

Why do we follow a class time table in the school?



PROBLEM EXERCISE

"Why do we come to school."

ACTIVITY - VII

SEEING PROBLEMS

Is the ability to be sensitive to problems.

OBJECTIVE

To enable the students to identify problems and defects.

MAIN STEPS

- (a) Take a common object
- (b) List defects and problems faced while using it.

PROCEDURE

Students asked to respond to given exercises.

DEMONSTRATION

' List the defects and problems faced while using a comb.'

PRACTICE

' List the defects and problems faced while using a bed. '

PROBLEM EXERCISE

' List the problems faced by students in the school campus. '

ACTIVITY - VIII

SUBSTITUTION

Is an ability to think of alternatives for a given object/process/situation so that new idea serves the given purpose.

OBJECTIVE

- (a) To develop the skill of thinking for replacement
- (b) To develop a faith that every idea/person/object can be replaced

MAIN STEPS

- (a) Examine a process/object

- (b) Brainstorm alternative functions of it.
- (c) Find new processes/objects for each and all the functions.

#### PROCEDURE

Students were asked to think of possible substitution / replacement for the given objects.

#### DEMONSTRATION

'Generate substitution for electric bulb.'

#### PRACTICE

'Generate substitution for clothes.'

#### PROBLEM EXERCISE

'Give substitution for water.'

#### ACTIVITY - IX

#### DEVELOPING ALTERNATE PERSPECTIVE

Is the ability to be able to think in the oppo-

site direction.

### OBJECTIVE

- (a) to help students to escape from routine ways.
- (b) to free them from given information and patterns of thinking,.
- (c) to overcome the terror of being wrong
- (d) to be provocative.

### MAIN STEPS

- (a) Present a situation
- (b) Ask for reversals

### PROCEDURE

The students were asked to reverse situations given to them as exercises.

### DEMONSTRATION

'What would happen if we had school during night time.'

### PRACTICE

'What would happen if man was immortal.'

PROBLEM EXERCISE

' What would happen in the year 2001 AD.'

ACTIVITY - X

IMAGERY AND VISUALISATION

Is the ability to form images and then relate the concepts to it.

OBJECTIVES

- (a) to develop free thinking
- (b) to encourage imagination

MAIN STEPS

- (a) Relax physically
- (b) Have a calm mind
- (c) close your eyes.
- (d) Listen and follow the instructions carefully.
- (e) Narrate the given scene.
- (f) Ask them to feel and think as if they are partners in the real event.
- (g) Slow down and ask them to relax.

(h) Open eyes.

PROCEDURE

The above procedure was followed for the demonstration exercise and practice exercise.

DEMONSTRATION

'Sunset on the beach.'

PRACTICE

'A scene at the bus stand.'

PROBLEM EXERCISE

'A rainy day.'

PROCEDURE

The Passi's Test of Creativity (Hindi Version) was administered to all the students of class IX of Government Boys School as the pre-test before the instructional period with the creativity intervention program began

in the experimental group.

The following 4 subtests were used -

Verbal tests including the Seeing Problems Test, the Unusual Uses Test and the Consequences Test, with 8 minutes allowed for each test and group administered. Non verbal test viz. Block creativity test was individually administered with 10 minutes allowed for the test.

The tests were administered using the standard directions described by Passi.

The instructional materials of the creativity enhancement program were then administered to the experimental group of 34 male subjects. The experimental group was divided into two subgroups of 17 students each.

The instructional material were administered at the rate of 3 activities per week over a period of 4 weeks (3 weeks plus the 10th activity in the following week)

Each activity with 4 phases viz. description, demonstration, practice and problem took approximately one class period of 40 minutes.

The descriptive phase involved the outlining of the objectives and the main steps of the activity wherever necessary. The demonstration and practice phases were included to help the student feel at ease with each activity. At the end of each activity each participant gave written responses for the problem exercises, the time limit of each being 5 minutes.

On the other hand the students of the control group spent equal time in routine classroom activities with no special instructional treatment during these same 4 weeks.

At the end of the 4th week the Passi's creativity test including the 3 verbal and 1 non-verbal test was administered as the post-test to the students of both the experimental and the



control groups. The verbal tests were presented simultaneously. It was not feasible to do so with the non-verbal test since it was an individually administered test. The same tests were used as pre and post tests since parallel forms are not available.

There was a three month gap between the pre-test and post-test administrations hoping that this was a sufficient time interval to offset memory, practice and other carry over effects.

The test responses were scored according to the instructions given in the manual by the author.

The scores on the following variables were obtained for each subtest -

- (i) Seeing Problems Test - Seeing Problems F.
- (ii) Unusual uses test - Unusual uses  
frequency UF; Unusual uses  
Flexibility UX; Unusual uses

originality UO; Unusual Uses

Creativity UC

- (iii) Consequences Test - Consequences fluency CF  
Consequences originality - CO;  
Consequences creativity - CC;
- (iv) Block Tests of Creativity -  
Blocks fluency BF ; Blocks flexibility BX;  
Blocks originality BO; Blocks creativity BC  
and
- (v) Composite creativity which includes total  
creativity scores on each of the subtests  
given above.

#### PILOT STUDY

A preliminary trial of research measures and techniques was carried out in a pilot study of a group of class VIII & Xth students. In the instructional material of the creativity intervention program changes were made in certain exercises so that they were closer to the immediate environment of the students., i.e. their daily life experiences at home, school and society.

Also, it was earlier planned to administer two exercises in the Demonstration phase in case the subjects found it difficult to understand but the quick response of the students in the pilot study made this unnecessary and only one exercise for the Demonstration phase was retained.

The creativity Intervention Program was translated into Hindi with the help of 2 teachers teaching Hindi to class IX of the same school as the sample under study. Wherever necessary minor changes were made to suit the vocabulary of the students.

Though 3 nonverbal tests viz. Test of Inquisitiveness, Square Puzzle Test & Block tests of Creativity have been developed by Passi only one was used viz. Block tests of creativity.

The test of Inquisitiveness was not used since the metronome was not easily available. The pilot study revealed that the square puzzle test was too simple for the students who achieved success on it much before 3 minutes which was the practice time and persistency was difficult to sustain. Since the Block Tests of

creativity yielded all the required subscores viz. fluency, flexibility and originality of creativity only this test was administered.

### STATISTICAL ANALYSIS

The Statistical technique of Analysis of covariance is used to control for initial differences between the groups. The effect of ANCOVA is to make the two groups equal with respect to one or more, control variables. ANCOVA is useful because one cannot select comparison groups that are matched with respect to all relevant variables except the one that is the main concern of the researcher's investigation. ANCOVA provides a post hoc method of matching groups on variables such as age, intelligence, socio-economic class.

C H A P T E R - I V

R E S U L T      A N D      A N A L Y S I S

## CHAPTER - IV

### RESULT AND ANALYSIS

As mentioned elsewhere, the present study is an attempt to ascertain the effects of creativity enhancement intervention on the creative potential of students. For this purpose 68 male students, studying in Class IX of a Hindi medium Government School of Delhi were chosen as subjects and assigned randomly to experimental and control groups respectively. Both, the treatment group and the control group had thus 34 students each. A pretest- posttest Experimental Control Group design was used.

To achieve the objectives of the study it was hypothesized that there may be no difference in the composite creativity scores, in the verbal creativity scores and in the nonverbal creativity scores before and after the intervention program and further there may be no difference in the scores of the students on the fluency, flexibility and originality factors of creativity before and after the creativity intervention program.

Instructional materials in the form of activities/ exercises were specially prepared by the Researcher following the procedure adopted by Pass, S (1989) as a

part of the creativity intervention program in an effort to enhance the creative thinking abilities of the students.

Four subtests of the Passi's test of creativity were used, three of which were verbal viz. Seeing Problem Test, Unusual Uses Test and Consequences Test, and one was a non-verbal test viz. Block Tests of Creativity. All these tests were administered before the start of the creativity intervention program and once again, three months after the intervention program to both the experimental and the control group (the detailed procedure is given in Methodology Chapter)

The statistical technique used was the Analysis of Covariance to test the validity of the formulated hypotheses. Analysis of covariance represents an extension of analysis of variance to allow for the correlation between initial and final scores. Covariance analysis is especially useful when for various reasons it is impossible or quite difficult to equate control and experimental groups at the start. Through covariance analysis one is able to effect adjustments in final or terminal scores which will allow for differences in some

initial variable (Garrett, 1979). Post test scores on the Passi's test of creativity were used as the dependent variable and Pretest scores were used as covariance. Separate analyses were conducted for each dimension : composite creativity, verbal creativity and non-verbal creativity. Also separate analyses were carried out for the different factors of creativity viz. fluency, flexibility and originality. In the analysis each pretest score which corresponded to the dependent variable, was used as the covariate.

The results are presented according to the formulated hypotheses :

To test the hypothesis - 1 viz. that, 'there may be no difference in the composite creativity scores of students before and after the intervention program', an analysis of covariance was carried out on the obtained scores of the students, to ascertain whether the intervention program had in any way affected the creativity scores of the students.



Tables No. 4.1, 4.2 and 4.3 present the raw scores of the students, analysis of variance for the pre-test and posttest scores and Summary of analysis of covariance respectively for composite creativity scores.

TABLE 4.1

RAW SCORES OF STUDENTS FOR COMPOSITE CREATIVITY ON PTC

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POST TEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
60	97	94	102
91	233	87	101
100	96	70	96
35	124	82	122
53	95	64	101
97	150	52	78
81	109	58	59
70	69	39	124
56	130	75	85
90	134	91	111
60	124	47	66
84	64	97	93
40	50	92	155
83	144	42	50
42	99	23	56
64	112	91	79
111	118	44	55
83	191	79	79
94	175	80	133
97	95	54	79
109	203	79	71
45	126	52	57
49	96	66	137
67	119	42	67
93	158	92	97
58	65	70	91

CONTD FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	29	66	44	81
	70	133	53	97
	130	103	19	104
	96	108	49	99
	28	87	53	77
	77	111	45	62
	53	111	60	99
	44	77	53	62
SUMS	2439	3972	2138	3025
MEAN	71.74	116.83	62.88	88.97

TABLE 4.2.

ANALYSIS OF VARIANCE OF PRE TEST (X) AND POST TEST (Y) SCORES, TAKEN SEPARATELY

Source of variation	df	S.S.x	S.S.y	M.Sx (Vx)	M.Sy(Vy)	F <sub>x</sub>	F <sub>y</sub>
Among Means	1	1332.36	13188.37	1332.36	13188.37	2.43	11.44* *
Within Groups	66	36148.15	76109.91	547.70	1153.18		

\* \* Significant at 0.01 level.

TABLE 4.3

ANALYSIS OF COVARIANCE FOR COMPOSITE CREATIVITY SCORES

Source of Variation	df	SS <sub>x</sub>	SS <sub>y</sub>	S <sub>xy</sub>	SS <sub>y.x</sub>	M.S. <sub>y.x</sub> (V <sub>y.x</sub> )	S.D <sub>y.x</sub>	F <sub>y.x</sub>
Among Means	1	1332.36	13188.37	4191.87	8004.08	8004.00		8.55**
Within Groups	65	36148	76109.91	23511.29	60817.82	935.66	30.59	

\*\* Significant at 0.01 level

The results of the above tables indicate that there is a significant difference in the pretest-posttest composite creativity scores of the students participating in the experimental group, thus rejecting the hypothesis, since the mean scores of the experimental group is significantly higher than that of the control group, the intervention program was effective in fostering the creative thinking abilities of the students.

#### HYPOTHESES - 2

There may be no difference in the verbal creativity scores of students before and after the intervention program.

Tables 4.4 and 4.5 present the raw scores of student and analysis of variance of the pre-test and posttest scores respectively.

TABLE 4.4

RAW SCORES OF STUDENTS FOR VERBAL CREATIVITY ON PTC

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
57	86	73	73
78	151	68	65
90	87	49	52
27	90	71	85
28	60	55	75
71	129	27	42
54	70	54	34
60	54	20	55
48	92	65	69
70	108	73	75
43	85	37	38
57	33	78	62
32	46	77	101
75	96	22	34
42	88	21	36
51	82	83	74
109	106	17	26
66	119	54	46
61	92	56	87
87	81	33	55
84	181	54	34
27	78	48	40
37	68	42	109
35	86	33	39

CONTD FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	73	131	54	49
	56	49	68	77
	27	49	35	53
	53	98	34	67
	89	94	67	45
	75	87	40	69
	15	72	34	43
	28	69	34	52
	42	94	28	55
	26	52	47	53
SUMS	1873	2693	1591	1969
MEAN	55.09	87.15	46.71	57.91



TABLE 4.5

ANALYSIS OF VARIANCE OF PRE TEST (X) AND POST TEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	d.f.	S.Sx	S.Sy	M.Sx(Vx)	M.Sy (Vy)	F <sub>x</sub>	F <sub>y</sub>
Among Means	1	1169.47	14529.94	1169.47	14529.94		
						2.52	21.86 * *
Within Groups	66	30686.29	438.65	464.94	664.62		

\* \* Significant at 0.01 level

Analysis of covariance was carried out on the pretest and posttest verbal creativity scores on Passi's test of creativity and the summary of ANCOVA is presented in Table 4.6.

TABLE 4.6

ANALYSIS OF COVARIANCE FOR VERBAL CREATIVITY SCORES

Source of Variation	d.f	S.Sx	S.Sy	S.Sxy	S.Sy.x	M.Sy.xVy.x	S.Dy.x	Fy.x
Among Means	1	1169.47	14529.94	4122.18	9264.45	9264.45		19.67**
Within Groups	65	30686.29	43865.0	20163.94	30615.29	471.00	21.70	

\*\* significant at 0.01 level

As is obtained in the above table (Table 4.6) the F ratio revealed significant difference in the pretest-posttest verbal creativity scores of the students participating in the experimental group. Since the mean posttest scores of the experimental group is significantly higher than that of the control group, the intervention program may be considered to have had a positive and significant effect on the verbal creativity scores of the experimental group. Thus the second null hypothesis has been rejected.

### HYPOTHESIS 3

There may be no significant difference in the nonverbal creativity scores of students before and after the intervention program.

Tables 4.7, 4.8 and 4.9 present the raw scores of students, summary of analysis of variance for the pretest and posttest scores and summary of analysis of covariance for the nonverbal creativity scores respectively.

TABLE 4.7

RAW SCORES OF STUDENTS ON NONVERBAL CREATIVITY TEST OF PTC

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
03	11	21	29
13	82	19	36
10	09	21	44
08	34	11	37
25	35	09	26
26	21	25	36
27	39	04	25
10	15	19	69
08	38	10	16
20	26	18	36
17	39	10	28
27	31	19	31
08	04	15	54
08	48	20	16
00	11	02	20
13	30	08	05
02	12	27	29
17	72	25	33
33	83	24	46
10	14	21	24
25	22	25	37
18	48	04	17
12	28	24	28
32	33	09	28
20	27	38	48
02	16	02	14

CONTD FROM PREPAGE

	$(X_1)$	$(Y_1)$	$(X_2)$	$(Y_2)$
	02	17	09	28
	17	35	19	30
	41	09	12	59
	21	21	09	30
	13	15	19	34
	49	42	11	10
	11	17	32	44
	18	25	06	09
SUMS	566	1009	547	1056
MEAN	16.65	29.68	16.09	31.06

TABLE 4.8

ANALYSIS OF VARIANCE OF PRE TEST (X) AND POST TEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	d.f.	S.S <sub>x</sub>	S.S <sub>y</sub>	M.S <sub>x</sub> (V <sub>x</sub> )	M.S <sub>y</sub> (V <sub>y</sub> )	F <sub>x</sub>	F <sub>y</sub>
Among Means	1	5.31	32.49	5.31	32.49	0.05	0.12
Within Groups	66	6812.5	17678.32	103.22	267.85		

TABLE 4.9

ANALYSIS OF COVARIANCE FOR NON-VERBAL CREATIVITY SCORES

Source of Variation	d.f.	S.Sx	S.Sy	Sxy	SSy.x	M.Syx (Vy.x)	S.Dyx	Fy.x
Among Means	1	5.31	32.49	-13.13	56.91	56.91		0.28
Within Groups	65	6812.5	17678.32	5461.94	13299.2	204.60	14.30	



The results obtained above, indicate that there is no significant difference in the pretest-posttest nonverbal creativity scores of the students participating in the experimental group thus accepting the null hypothesis. Results reveal that the creativity intervention program was not significantly effective in fostering the nonverbal creative thinking abilities of the students.

Hypothesis 4.

There may be no difference in the scores of the students on the fluency factor of creativity before and after the intervention program.

Tables 4.10 and 4.11 present the raw scores of students and the analysis of variance for the pretest and posttest scores respectively on the fluency factor of creativity.

Table§ 4.12 presents the results of analysis of covariance on the pretest and posttest scores of the fluency component of creativity on Passi's test of creativity.

TABLE 4.10

RAW SCORES OF STUDENTS ON THE FLUENCY COMPONENT OF CREATIVITY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
8.75	13.75	13.0	15.0
14.75	28.50	10.5	12.75
14.25	16.50	8.5	12.0
5.25	16.50	12.25	16.5
6.50	11.50	8.75	14.75
11.50	17.75	6.50	10.0
10.75	11.75	6.50	7.0
10.50	10.75	4.75	12.50
8.75	17.25	11.0	13.75
13.0	18.25	13.25	15.0
8.0	15.0	7.50	8.75
11.0	9.5	13.25	11.25
6.0	7.25	13.50	20.0
13.25	15.75	4.75	6.25
9.0	15.75	3.75	6.25
10.25	16.75	13.25	13.0
15.50	17.25	5.25	7.50
10.75	20.25	10.50	10.75
10.50	18.50	10.50	15.75
12.50	13.50	6.50	10.25
17.25	28.0	10.0	6.75
4.75	16.0	7.5	8.5
6.75	11.75	9.75	18.25
8.50	17.50	7.0	9.5
12.0	21.75	12.0	11.0
10.25	10.50	11.0	13.25

CONTD FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	4.25	8.25	5.75	9.75
	8.75	16.0	6.50	12.25
	17.0	13.75	2.25	11.50
	14.75	17.0	7.50	14.0
	4.0	10.5	6.75	8.50
	9.0	14.75	7.0	9.75
	7.5	16.0	7.25	12.0
	5.5	9.75	8.0	9.0
SUMS	341	523.5	292	393
MEAN	10.03	15.40	8.59	11.56

TABLE 4.11

ANALYSIS OF VARIANCE OF PRE TEST (X) AND POST TEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	d.f.	S.S.x	S.S.y	M.Sx(Vx)	M.Sx(Vy)	Fx	Fy
Among Means	1	35.30	250.45	35.30	250.45	3.19	14.78 * *
Within Groups	66	730.76	1118.81	11.07	16.95		

\* \* significant at 0.01 level

TABLE 4.12

ANALYSIS OF COVARIANCE FOR FLUENCY SCORES

Source of Variation	d.f.	S.Sx	S.Sy	S.xy	S.S.y.x	M.Sy.x (Vy.x)	S.D	Fy.x
Among Means	1	35.30	250.45	94.03	127.24	127.24		11.17 * *
Within Groups	65	730.76	1118.81	525.90	740.34	11.39	3.37	

\* \* significant at 0.01 level

From the above analysis it is seen that the fluency scores of the experimntal group had increased significantly as compared to that of control group. Thus the null hypothesis was rejected. From this it is clearly evident that the creativity intervention program had a significant positive effect in enhancing the fluency component of creativity of the students.

Since the fluency scores on the P.T.C. included scores on both the verbal and non-verbal tests, further analysis was carried out regarding verbal fluency as measured by the verbal tests and non-verbal fluency as measured by the non-verbal test. Separate analysis of covariance was carried out on the pretest and posttest scores of the verbal fluency and nonverbal fluency component of creativity.

Tables 4.13, 4.14 and 4.15 gives the relevant data for verbal fluency scores.

Tables 4.16, 4.17 and 4.18 gives the relevant data for nonverbal fluency scores.

TABLE 4.13

RAW SCORES OF STUDENTS ON VERBAL FLUENCY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
11.33	17.33	15.33	17.33
18.67	31.33	12.33	14.0
18.0	21.33	9.67	12.0
6.33	19.0	15.33	19.0
16.67	12.67	10.67	17.0
13.33	22.0	6.67	10.67
12.0	12.67	8.33	7.33
13.33	13.33	4.67	11.67
11.0	20.33	14.0	17.0
15.67	22.67	16.0	16.0
9.33	16.0	9.33	10.0
12.67	10.0	16.33	12.67
7.33	9.33	16.33	23.0
17.0	18.0	4.67	7.0
12.0	20.33	4.67	6.67
12.67	20.0	17.0	17.0
20.33	21.33	4.33	6.67
12.33	21.0	11.67	11.0
11.67	18.33	12.0	17.33
15.67	16.67	7.33	12.0
20.0	35.65	11.33	5.67
5.0	16.67	9.33	9.33
8.0	13.67	11.0	22.0
8.67	20.0	8.67	10.0
14.67	27.33	12.67	10.0
13.33	12.33	14.33	16.33



CONTD. FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	5.33	9.33	7.0	10.33
	10.33	18.67	7.33	14.0
	19.67	17.67	2.0	10.33
	18.0	21.0	9.33	16.33
	4.33	12.33	7.33	8.67
	8.0	16.0	8.33	12.33
	9.33	20.0	7.33	12.67
	5.67	10.67	10.0	11.0
SUMS	407.66	614.99	342.64	434.33
MEAN	11.99	18.09	10.08	12.77

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TABLE 4.14

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Scores of Variation	D.F.	S.Sx	S.Sy	M.Sx(Vx)	M.S.y(Vy)	Fx	Fy
Among Means	1	62.17	479.97	62.17	479.97		
						3.19	18.74**
Within Groups	66	1286.14	1690.58	19.49	25.61		

\*\* significant at 0.01 level

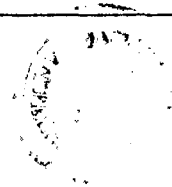


TABLE 4.15

ANALYSIS OF COVARIANCE FOR VERBAL FLUENCY SCORES

Source of Variation	d.f.	S.Sx	S.S.y	Sxy	S.S.y.x	M.Sy.x(Vy.x)	S.Dy.x	Fy.x
Among Means	1	62.17	479.97	172.74	251.45	251.45		
								15.94 * *
Within Groups	65	1286.14	1690.58	925.26	1024.94	15.77	3.97	

\* \* significant at 0.01 level

TABLE 4.16

RAW SCORES OF STUDENTS ON NONVERBAL FLUENCY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POST TEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
1.0	3.0	6.0	8.0
3.0	20.0	5.0	9.0
3.0	2.0	5.0	12.0
2.0	9.0	3.0	9.0
6.0	8.0	3.0	8.0
6.0	5.0	6.0	8.0
7.0	9.0	1.0	6.0
2.0	3.0	5.0	15.0
2.0	8.0	2.0	4.0
5.0	5.0	5.0	12.0
4.0	14.0	2.0	5.0
6.0	8.0	4.0	7.0
2.0	1.0	5.0	11.0
2.0	9.0	5.0	4.0
0.0	2.0	1.0	5.0
3.0	7.0	2.0	1.0
1.0	5.0	8.0	10.0
6.0	18.0	7.0	10.0
7.0	19.0	6.0	11.0
3.0	4.0	4.0	5.0
9.0	5.0	6.0	10.0
4.0	14.0	2.0	6.0
3.0	6.0	6.0	7.0
8.0	10.0	2.0	8.0
4.0	5.0	10.0	14.0
1.0	5.0	1.0	4.0

CONTD FROM PRE PAGE

X <sub>1</sub>	Y <sub>1</sub>	X <sub>2</sub>	Y <sub>2</sub>
1.0	5.0	2.0	8.0
4.0	8.0	4.0	7.0
9.0	2.0	3.0	15.0
5.0	5.0	2.0	7.0
3.0	5.0	5.0	8.0
12.0	11.0	3.0	2.0
2.0	4.0	7.0	10.0
5.0	7.0	2.0	3.0
SUMS 141	251	140	269
MEANS 4.15	7.38	4.12	7.91

TABLES 4.17

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY.

Source of Variation	df	S.S.x	S.S.y	M.SxVx	M.Sy.Vy	Fx	Fy
Among Means	1	0.02	4.77	-02.0	4.77	0.0	0.27
Within Groups	66	407.79	1164.76	6.18	17.65		

TABLE 4.18

ANALYSIS OF COVARIANCE OF NONVERBAL FLUENCY SCORES

Source of Variation	df	S.S.x	SSy	Sxy	SSy.x	M.Sy.x(Vy.x)	S.Dy.x	Fy.x
Among Means	1	0.02	4.77	-0.26	5.14	5.14		0.34
Within Groups	65	407.79	1164.76	279.44	973.27	14.97	3.87	

From the above analysis (Tables 4.13, 4.14 4.15, 4.16, 4.17 & 4.18) the following conclusions emerge.

1. The F value for the verbal fluency scores appears statistically significant with the post test mean scores of the experimental group (M=18.09) being higher than that of the control group (M=12.77). In other words, the intervention program appears to have had a significant effect on the enhancement of verbal fluency.
2. On the other hand, the F value for treatment in case of non verbal fluency scores is not significant suggesting that the creativity intervention program was not significantly effective, in enhancing the subjects' nonverbal creativity.



Hypothesis 5:

There may be no difference in the scores of the students on the flexibility factor of creativity before and after the intervention program.

Tables 4.19, 4.20 and 4.21 presents the raw scores of students, summary of analysis of variance for pretest & posttest scores and summary of analysis of covariance, respectively for the flexibility factor of creativity.

TABLE 4.19

RAW SCORES OF STUDENTS ON FLEXIBILITY FACTOR

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POST TEST ( $Y_2$ )
5.5	6.0	6.5	5.0
5.0	8.5	6.0	5.5
5.5	4.5	5.0	5.5
2.5	6.0	4.0	6.5
4.5	5.5	4.0	4.0
6.5	9.5	4.0	6.0
6.0	7.5	3.5	5.0
3.5	5.0	3.5	8.0
3.5	6.5	4.0	4.5
6.0	8.5	5.5	4.5
4.5	8.0	2.0	4.0
6.5	3.5	6.5	4.0
3.0	4.0	5.0	8.0
5.5	9.0	3.0	3.5
2.0	4.5	2.0	5.5
3.5	7.5	5.5	4.0
6.5	5.5	2.5	3.0
3.5	6.5	4.5	4.0
6.0	9.5	6.0	7.0
6.5	7.0	3.5	4.0
7.5	7.5	3.0	4.5
3.5	9.0	4.5	3.5
3.5	5.0	4.5	8.0
3.5	6.5	3.0	4.5
5.5	8.5	6.0	6.5

CONTD FROM PRE PAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	3.0	4.5	4.0	5.0
	3.0	4.5	4.5	7.0
	6.0	8.5	3.5	5.0
	6.0	5.5	2.0	4.0
	5.5	7.0	4.0	3.0
	2.5	5.5	4.5	4.5
	4.5	6.5	4.0	4.0
	4.0	6.0	3.5	5.0
	3.5	4.0	3.0	4.0
SUMS	157.5	221.0	140.5	170.0
MEAN	4.63	6.50	4.13	5.0

TABLE 4.20

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	d.f.	S.S.x	S.S.y	M.S.x(Vx)	M.S.yVy	Fx	Fy
Among Means	1	4.25	38.25	4.25	38.25	2.31	15.49**
Within Groups	66	121.31	163.0	1.84	2.47		

\*\* significant at 0.01 level

TABLE 4.21

ANALYSIS OF COVARIANCE FOR FLEXIBILITY SCORES

Source of Variation	d.f	S.Sx	S.S.y	Sxy	S.S.y.x.	M.S.y.x(Vy.x)	S.Dy.x	Fy.x
Among Means	1	4.25	38.25	12.75	27.2	27.2.		12.53**
Within Groups	65	121.31	163.0	51.75	140.92	2.17	1.47	

\*\* significant at 0.01 level

From the above tables it is clear that there appears a significant difference between the pretest posttest flexibility scores of the students participating in the experimental group, thus rejecting the H Hypothesis 5. Results suggest that the intervention program has had a positive effect on the flexibility scores of the experimental group.

Further analysis was carried out regarding verbal flexibility as measured by the verbal tests and non-verbal flexibility as measured by the nonverbal test of the Passi's test of creativity.

Separate analyses of covariance were carried out on the pretest and posttest scores of the verbal flexibility and nonverbal flexibility components of creativity (Tables 4.22, 4.23 4.24, 4.25, 4.26 & 4.27).

TABLE 4.22

RAW SCORES OF STUDENTS ON VERBAL FLEXIBILITY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POST TEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
10.0	9.0	3.0	5.0
7.0	10.0	7.0	5.0
8.0	7.0	5.0	7.0
4.0	10.0	5.0	6.0
4.0	5.0	6.0	5.0
8.0	15.0	3.0	5.0
7.0	9.0	6.0	6.0
5.0	7.0	3.0	5.0
5.0	7.0	6.0	6.0
8.0	12.0	8.0	5.0
6.0	11.0	3.0	5.0
8.0	0.0	10.0	5.0
4.0	7.0	6.0	9.0
9.0	10.0	3.0	5.0
4.0	7.0	3.0	7.0
4.0	10.0	10.0	7.0
12.0	9.0	1.0	2.0
4.0	6.0	8.0	5.0
6.0	9.0	6.0	7.0
10.0	10.0	4.0	5.0
10.0	11.0	2.0	5.0
3.0	10.0	7.0	3.0
4.0	5.0	4.0	10.0
3.0	8.0	4.0	4.0

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	7.0	13.0	6.0	8.0
	5.0	6.0	7.0	8.0
	5.0	6.0	7.0	8.0
	8.0	10.0	6.0	7.0
	10.0	9.0	1.0	3.0
	7.0	9.0	7.0	4.0
	2.0	8.0	4.0	6.0
	1.0	7.0	5.0	7.0
	6.0	9.0	3.0	6.0
	4.0	5.0	5.0	7.0
SUMS	208	286	179.0	198.0
MEAN	6.12	8.41	5.26	5.82



TABLE 4.23

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	df	S.S.x	S.S.y	M.S.x(Vx)	M.Sy(Vy)	Fx	Fy
Among Means	1	12.36	113.08	12.36	113.88		
						2.05	21.9**
Within Groups	66	398.15	348.18	6.03	5.20		

\*\* significant at 0.01 level

TABLE 4.24

ANALYSIS OF COVARIANCE FOR VERBAL FLEXIBILITY SCORES

Source of Variation	df	S.S.x	S.S.y	Sxy	SS $\bar{y}.x$	M.Sy.x(Vy.x)	S.Dy.x	Fy.x
Among Means	1	12.36	113.88	37.53	91.43	91.43		18.97**
Within Groups	65	398.15	343.18	108.94	313.37	4.82	2.19	

\* \* significant at 0.01 level

TABLE 4.25

RAW SCORES OF STUDENTS ON NONVERBAL FLEXIBILITY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POST TEST ( $Y_2$ )
1.0	2.0	5.0	5.0
3.0	7.0	5.0	6.0
3.0	2.0	5.0	4.0
1.0	2.0	3.0	7.0
5.0	6.0	2.0	3.0
5.0	4.0	5.0	7.0
5.0	6.0	1.0	4.0
2.0	3.0	4.0	11.0
2.0	6.0	2.0	3.0
4.0	5.0	3.0	4.0
3.0	5.0	1.0	3.0
5.0	7.0	3.0	3.0
2.0	1.0	4.0	7.0
2.0	8.0	3.0	2.0
0.0	2.0	1.0	4.0
3.0	5.0	1.0	1.0
1.0	2.0	4.0	4.0
3.0	7.0	1.0	3.0
6.0	10.0	6.0	7.0
3.0	4.0	3.0	3.0
5.0	4.0	4.0	4.0
4.0	8.0	2.0	4.0
3.0	5.0	5.0	6.0
4.0	5.0	2.0	5.0
4.0	4.0	6.0	5.0
1.0	3.0	1.0	2.0

CONTD FROM PRE PAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	1.0	3.0	2.0	6.0
	4.0	7.0	1.0	3.0
	2.0	2.0	3.0	5.0
	4.0	5.0	1.0	2.0
	3.0	3.0	4.0	3.0
	8.0	6.0	3.0	1.0
	2.0	3.0	4.0	4.0
	3.0	3.0	1.0	1.0
SUMS	107	155	101	142
MEAN	3.15	4.56	2.97	4.18

TABLE 4.26

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY.

Source of Variation	df	S.Sx	S.S.y	M.Sx(Vx)	M.Sy(Vy)	Fx	Fy
Among Means	1	0.52	2.49	0.52	2.71	0.19	0.59
Within Groups	66	179.25	301.33	2.71	4.57		

TABLE 4.27

ANAYSIS OF COVARIANCE FOR NONVERBAL FLEXIBILITY SCORES

Source of Variation	df	S.Sx	S.S.y	Sxy	SSy.x	M.S.y.x ( $V_{y.x}$ )	S.Dy.x	Fy.x
Among Means	1	0.52	2.49	1.15	1.06	1.06		0.34
Within Groups	65	179.24	301.32	134.38	200.87	3.09	1.76	

From the above analysis (Table 4.24) it is seen that there is a significant difference in the pretest posttest verbal flexibility scores of the students participating in the experimental group, suggesting that the creativity intervention program had a significant positive effect on the verbal flexibility component of creativity of the experimental group.

On the other hand Table 4.27 indicates that there was no significant difference in the pretest - posttest ~~non-verbal~~ flexibility scores of the students participating in the experimental group. Thus the creativity intervention program was not significantly effective in fostering the non-verbal flexibility component of creativity of the students.

HYPOTHESES - 6

There may be no difference in the scores of the students on the originality factor of creativity before and after the intervention program.

Tables 4.28, 4.29, 4.30 present the raw scores of students, summary of analysis of variance for pretest and posttest scores, summary of analysis of covariance respectively for the originality factor of creativity.



TABLE 4.28

RAW SCORES OF STUDENTS ON ORIGINALITY FACTOR

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
4.67	10.33	9.67	10.67
7.33	34.0	11.0	13.0
10.67	7.0	8.67	12.33
3.0	15.33	8.33	14.33
6.0	12.67	7.0	11.33
12.67	20.0	6.0	8.67
8.67	15.67	8.33	7.0
7.0	5.33	4.33	19.33
4.67	16.0	7.67	7.0
8.67	14.67	9.0	14.0
6.33	15.33	4.33	7.67
9.0	3.33	10.33	13.33
3.33	4.33	9.33	19.67
6.33	21.0	5.67	6.0
0.67	9.0	1.33	6.67
5.33	10.0	9.0	6.33
12.0	12.67	6.0	6.33
11.0	32.33	9.33	9.33
13.33	27.33	8.67	18.67
11.33	9.0	7.0	10.0
8.33	25.33	11.0	11.67
6.33	14.67	4.33	5.33
5.0	13.0	6.0	16.0
10.0	12.0	2.67	6.67
11.33	18.0	10.67	13.33
3.67	4.67	6.0	9.33

CONTD. FROM PRE PAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	2.0	8.0	4.0	9.33
	7.67	17.33	6.67	12.67
	16.67	12.33	2.0	16.67
	8.67	8.67	3.67	12.33
	2.33	11.33	6.0	11.33
	10.67	13.0	3.0	5.0
	5.0	11.67	8.0	13.67
	5.0	10.0	5.0	6.0
SUMS	254.67	475.32	230	370.99
MEAN	7.49	13.98	6.76	10.91

TABLE 4.29

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	df	S.S.x	S.S.y	M.Sx.Vx	M.Sy.Vy	Fx	Fy
Among Means	1	8.95	160.07	8.95	160.07	0.87	4.52 **
Within Groups	66	677.63	2335.34	10.25	35.38		

\*\* significant at 0.01 level

TABLE 4.30

ANALYSIS OF COVARIANCE FOR ORIGINALITY SCORES

Source of Variation	df	S.Sx	S.Sy	Sxy	S.S.y.x	M.Sy.x	Vy.x	S.Dy.x	Fy.x
Among Means	1	8.95	160.07	37.85	117.31	117.31			
Within Groups	65	677.63	2335.34	396.29	2103.58	32.36	5.69		3.63

From the Table 4.30 it appears that there is no significant difference in the pretest posttest scores on the originality component of creativity of the students participating in the experimental group, thus accepting the Hypothesis 6.

However results from the analysis indicate a trend for subjects in the experimental group to score higher on the originality component of creativity as compared to the students in the control group.

Further analysis was carried out with respect to verbal originality as measured by the verbal tests and non-verbal originality as measured by the non-verbal test of PTC. Separate analyses of covariance were carried out on the pretest and posttest scores of the verbal originality and nonverbal originality and the results are presented in Tables 4.31 to 4.36.

TABLE 4.31

RAW SCORES OF STUDENTS ON VERBAL ORIGINALITY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
6.5	12.5	9.5	8.0
7.5	23.5	12.0	9.0
14.0	8.0	7.5	4.5
2.0	11.5	10.0	11.0
2.0	8.5	8.5	9.5
11.5	24.0	2.0	2.5
5.5	11.5	11.5	3.0
7.5	3.5	1.5	7.5
5.0	12.0	8.5	6.0
7.5	14.0	8.5	11.0
4.5	13.0	3.0	1.5
5.5	1.5	9.5	9.5
3.0	5.5	11.0	11.5
7.5	16.0	2.5	4.0
1.0	10.0	2.0	4.5
4.5	6.0	11.0	8.0
18.0	16.5	1.5	2.0
12.5	25.0	5.5	4.0
10.0	14.0	7.0	14.0
15.0	10.5	3.5	7.0
7.0	31.5	9.0	6.0
4.5	9.0	6.5	4.5
4.5	11.0	2.5	16.5
5.0	9.0	1.5	2.5
11.0	18.0	5.0	5.5
5.5	3.0	9.0	10.0

CONTD FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	3.0	7.5	3.5	7.0
	7.0	16.0	3.0	9.0
	10.0	16.0	0.0	5.5
	7.0	7.5	2.5	8.0
	0.0	13.5	4.0	5.5
	1.5	7.0	2.0	4.0
	4.0	12.5	1.5	5.5
	2.5	7.5	6.0	6.5
SUMS	223	416.0	192	234
MEAN	6.56	12.24	5.65	6.88

TABLE 4.32

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	df	S.S.x	S.S.y	M.S.x(Vx)	M.Sy(Vy)	Fx	Fy
Among Means	1	14.13	487.11	14.13	487.11		
						0.94	17.37**
Within Groups	66	989.9	1851.46	15.00	28.05		

\*\* significant at 0.01 level



TABLE 4.33

ANALYSIS OF COVARIANCE FOR VERBAL ORIGINALITY

Source of Variation	df	S.Sx	S.S.y	Sx.y	SSy.x	M.S.y.x(Vy.x)	S.Dy.x	Fy.x
Among Means	1	14.13	487.11	82.97	400.02	400.02		16.34**
Within Groups	65	989.9	1851.46	507.62	1591.15	24.48	4.95	

\*\* significant at 0.01 level

TABLE 4.34

RAW SCORES OF STUDENTS ON NONVERBAL ORIGINALITY

EXPERIMENTAL GROUP		CONTROL GROUP	
PRETEST ( $X_1$ )	POSTTEST ( $Y_1$ )	PRETEST ( $X_2$ )	POSTTEST ( $Y_2$ )
1.0	6.0	10.0	16.0
7.0	55.0	9.0	21.0
4.0	5.0	11.0	28.0
5.0	23.0	5.0	21.0
14.0	21.0	4.0	15.0
15.0	12.0	14.0	21.0
15.0	24.0	2.0	15.0
6.0	9.0	10.0	43.0
4.0	24.0	6.0	9.0
11.0	16.0	10.0	20.0
10.0	20.0	7.0	20.0
16.0	16.0	12.0	21.0
4.0	2.0	6.0	36.0
4.0	31.0	12.0	10.0
0.0	7.0	0.0	11.0
7.0	18.0	5.0	3.0
8.0	47.0	17.0	20.0
20.0	54.0	12.0	28.0
4.0	6.0	14.0	16.0
11.0	13.0	15.0	23.0
10.0	26.0	0.0	7.0
6.0	17.0	13.0	15.0
20.0	18.0	5.0	15.0
12.0	18.0	22.0	29.0
0.0	8.0	0.0	8.0
0.0	5.0	15.0	15.0

CONTD FROM PREPAGE

	(X <sub>1</sub> )	(Y <sub>1</sub> )	(X <sub>2</sub> )	(Y <sub>2</sub> )
	0.0	9.0	5.0	14.0
	9.0	20.0	14.0	20.0
	30.0	5.0	6.0	39.0
	12.0	11.0	6.0	21.0
	7.0	7.0	10.0	23.0
	29.0	25.0	5.0	7.0
	7.0	10.0	21.0	30.0
	10.0	15.0	3.0	5.0
SUMS	318	603	306	645
MEAN	9.35	17.74	9.0	18.97

TABLE 4.35

ANALYSIS OF VARIANCE OF PRETEST (X) AND POSTTEST (Y) SCORES TAKEN SEPARATELY

Source of Variation	df	S.S.x	S.S.y	M.Sx.Vx	M.Sy.Vy	Fx	Fy
Among Means	1	2.12	25.94	2.12	25.94		
						0.06	0.20
Within Groups	66	2865.76	8579.59	34.33	129.99		

TABLE 4.36

ANALYSIS OF COVARIANCE OF NONVERBAL ORIGINALITY SCORES

Source of Variation	df	S.S.x	S.S.y	Sxy	S.S.y.x	M.Sy.x(Vy.x)	S.Dy.x	Fy.x.
Among Means	1	2.12	25.94	-7.42	34.61	34.61		0.29
Within Groups	65	2865.76	8579.59	1558.18	7732.37	118.96	10.91	

From the above tables it is seen that the F value for treatment in case of the verbal originality scores shows statistically significant difference. Since the mean score of the experimental group is significantly higher than that of the control group, it may be inferred that the treatment had a significant effect on the enhancement of verbal originality.

On the other hand the F value for the treatment in case of nonverbal originality scores is not significant suggesting that the creativity intervention program was not effective in enhancing the subjects' nonverbal originality factors.

The results of the study have thus categorically shown that creative thinking in children can be enhanced by devising suitable creativity intervention program.

C H A P T E R - V

D I S C U S S I O N

## CHAPTER - V

### DISCUSSION

The present study was designed to investigate the effect of creativity intervention program in enhancing the creativity of students.

To achieve the objectives of the study, an intervention program was developed and its efficacy was ascertained in facilitating the composite, verbal and nonverbal creativity of students. The differential effects of creativity training on the different factors of creativity, viz. fluency, flexibility and originality, were also examined.

The results of the study provided significant support for the effectiveness of creativity intervention program in nurturing the creative thinking abilities of the students.

The detailed results are being discussed in the following section in order of the preformulated hypotheses in the light of the available literature.



The first hypothesis stating that there may be no difference in the composite creativity scores of students before and after the intervention program was rejected. The analysis of the results suggests that the intervention program was effective in fostering the composite creative abilities of the students. Empirical evidence implies that creativity can be enhanced (Passi & Jarial, 1983; Rose & Lin 1984; Cohn 1985). Albano's (1987) study of creative thinking abilities of adults reported that training was successful in improving both verbal and non-verbal expressions of creativity. The experimental training program focussed on the core thinking processes viz. imagery, analogy, association and transformation. Two specially devised experimental treatments were introduced. These included an "intervention" activity and a relaxation/visual stimulation" activity.

The results of a study by Goor and Rapoport (1977) also reported an immediate positive effect of training on the creativity scores of the experimental group which consisted of disadvantaged children from sixth and

seventh grades. The training program constituted of creativity games which included those of brainstorming, sensory displacement, visits from outer space, semantic variations, strange world, pictures looking for titles and problem solution - problem sequence.

The above studies made use of training programs which differ from that of the present study. Also the sample under study varied from that of the present study.

Katiyar and Jarial (1985) have reported results similar to that of the present study. The sample also constituted of IX standard students. Two types of creativity developing programs viz. the verbal creativity developing program which constituted of exercises based upon the immediate environment of the students and a non-verbal creativity developing program, where the content of the exercises included training in drawing various meaningful figures from simple geometrical shapes and making meaningful figures from a few given sketches. The results established a significant effectiveness of the verbal creativity developing program and the nonverbal

creativity developing program in developing different dimensions of verbal and nonverbal creativity respectively. The Torrance Tests of creative thinking were employed as the criterion of the effectiveness of the creativity training material. In the present study PTC, a test developed in the Indian context was used as the criterion measure. Since composite creativity involves both verbal and nonverbal creativity further analysis of the results was carried out in terms of these dimensions of composite creativity.

Analysis of the result implies that the intervention program may be considered to have had a positive and significant effect in enhancing the verbal creativity of the students, thus rejecting the second null hypothesis. These results are in keeping with those reported by Treffinger 1974, Katiyar & Jarial, 1983; Bhaskara, 1988 and Veeraraghawan & Samal, 1990. In the above studies the facilitation of verbal creativity was specifically examined. Treffinger (1974) found that both Purdue creative thinking program and Productive Thinking Program enhanced the fifth graders' verbal thinking

abilities. Veeraraghavan and Samaal (1990) reported that a structured creativity enhancement program based on Durnin's model significantly enhanced the creativity in the students.

Results of the study reported by Katiyar & Jarial (1983) on high school students and Bhaskara (1988) on class VI students support the conclusion that verbal creativity can be developed through a process oriented training program.

Analysis of the results of the nonverbal creativity scores indicate that the creativity intervention program was not significantly effective in fostering the nonverbal creative thinking abilities of students. Hypothesis which stated that there may be no significant difference in the nonverbal creativity scores of the students before and after the intervention program, was thus accepted.

The obtained results are in disagreement with those reported by Khatena, 1971 and Jarial, 1981. Khatena 1971 studied the effect of a training procedure on preschool

children and concluded that children could be improved on nonverbal creativity. Jarial (1981) also reported similar results for class IX students.

This disparity in impact of training on verbal and nonverbal creativity needs further explanation. It can be accounted for, in part by the verbal nature of the intervention program used in the present study. The training program relied on verbal activities during, both, the demonstration and practice phases.

An indepth analysis of creativity intervention programs by Rose & Lin (1984) also had suggested that intervention programs have a stronger impact on verbal creativity as compared to nonverbal creativity because of the high reliance on verbal activities in most training programs. Huberetal (1979) had also reported the absence of significant gain scores on nonverbal tasks after using the Purdue Creativity training program, which is verbal in nature, to foster the creative thinking abilities of gifted students. On the other hand it was successful in enhancing the verbal fluency of the participants.

Gupta (1980) in a factorial study of verbal and nonverbal creativity found that verbal creativity and nonverbal creativity were two separate dimensions in the structure of creativity.

Perhaps a different set of activities in the creativity intervention program, emphasizing nonverbal creativity, would be needed to foster this dimension of creativity.

The difference in the nature of subtests used to measure verbal creativity and nonverbal creativity can also be cited as one of the reasons for not achieving success in enhancing the nonverbal creativity, since verbal creativity was measured through a group administered test whereas nonverbal creativity was measured through an individual administered test. Participants might have had a feeling of threat when they were involved in an individual situation where it was obvious that they were being evaluated there and then. This might have affected their performance on the nonverbal test. Wallach and Kogan (1965) believe that participants are likely to take bigger risks with ideas

in the group, than if each were alone in assuming responsibility for his idea.

The time of the day of the experimental condition is also shown to affect creativity scores. (Burns, 1984; Shaklee, 1986). The results given above can be related to the time of the day of the administration of the non-verbal test. In the present study the enhancement intervention was carried out in the first half of the day. Also the verbal tests of the pretest and the posttest conditions were administered in the first half of the day. However, the performance test was administered during the latter half of the day. The students might feel more enthusiastic in the beginning of the day. Further investigation is warranted in this area.

Another possibility that exists is that the nonverbal tests of creativity measure a more innate aspect of creativity that cannot be affected much by training (Rose & Lin, 1984). However, programs designed to utilize nonverbal exercises in training need to be researched more thoroughly before this assumption can be accepted.

Further analysis with respect to the different factors of creativity viz. fluency, flexibility and originality, was carried on to find out which of the creativity factors were more sensitive to fostering effects. Results suggest that the creativity intervention program had a significant positive effect in enhancing the fluency and flexibility factors of creativity, rejecting the hypotheses which state that there may be no difference in the scores of the students on the fluency factor and the flexibility factor of creativity before and after the intervention program.

Regarding the originality dimension, obtained results suggest that there is no significant difference in the pretest and posttest scores on this factor, thus accepting the sixth specific hypothesis.

Though statistically there is no significant difference, results from the analysis indicate a trend for the subjects in the experimental group to score higher on the originality component of creativity.

The profound impact of training on the originality



factor has not been observed in the present study. A probable explanation for this finding could be the fact that the creativity tests are timed tests. This does not leave much scope for the respondents to give original ideas where 'originality' is defined as the ability to produce ideas away from the obvious, commonplace, banal or established. On the other hand, higher scores on 'fluency' which is defined as the ability to produce a large number of ideas, with words, and the factor 'flexibility', which is defined as the ability to produce a variety of ideas are both easier to account for as it is less time consuming to generate fluent and flexible ideas.

Furthermore, the nature of the material used in the subtests of creativity does not appear to provide much scope for original responses. Hence the ceiling effect may have been reached prematurely. Perhaps more challenging materials are necessary to engender original responses.

The examination of the results of each creativity

component separately indicates that the present creativity training program had a differential effect on verbal and nonverbal dimensions of creativity. There is marked disparity in the effectiveness of the training program on the verbal and nonverbal components of creativity. While verbal fluency, flexibility and originality were profoundly affected by the intervention program, there was no significant effect of the treatment on nonverbal fluency, flexibility and originality. A review of the studies using the Creative Problem Solving Program (CPSP) by Osborn Parnes, which is verbal in nature, also indicates that verbal fluency flexibility and originality were profoundly affected by CPSP whereas figural fluency, flexibility and originality were only slightly affected. (Rose & Lin, 1984). Raina & Chaturvedi (1970) reported an increase in verbal fluency scores as a result of CPS Course.

Fontenot (1988) also using the CPS reported significant increase in verbal fluency and flexibility.

Tweet's (1980) study indicated an improvement in verbal fluency and originality after a creativity training

program. Huber (1979) also reported similar results regarding these two dimensions. Khatenas studies (1970; 1971) on training give evidence that verbal originality can be increased through training.

Thus the results of the present study regarding the verbal components of creativity, substantiate the findings of previous studies, to suggest that the different dimensions of verbal creativity can be enhanced through intervention.

Regarding the explanation for the absence of significant gains on the nonverbal dimensions of creativity the same arguments as given in a previous section hold true .

Another comment on the overall results is that, in general, there has been an increase in the posttest scores of the control group also. A possible explanation for this increase is the effect of the nature of instructions for the various subtests, which motivate the students to improve their previous performance. The students are

instructed to 'give unusual and interesting responses, which they feel that nobody else in their class will be in a position to give'.

Empirical evidence suggests that the nature of instruction can influence the creativity scores (Copley & Feuring, 1971, Torrance, 1972). But this increase in the creativity scores of the control group is not significant. Torrance (1972) states that 'motivating conditions certainly make a difference in creative functioning but differences seem to be greatest and most predictable when deliberate creative teaching is involved'. The findings of the present study corroborate the above statement.

Thus the results of this study provide significant support for the effectiveness of programmed creativity instructional materials in enhancing the creative thinking abilities of the students.

The program was particularly successful in influencing the verbal creativity of class IX students.

On the appropriateness of the Enhancement Program  
to foster Creativity

One of the most fundamental questions raised by the present study is whether programs designed to promote creative thinking are actually needed, seen in the perspective of a child's total educational career.

One major objection to creative activities in education is that they are a waste of time (Torrance & Torrance, 1972). This objection is invalid if disciplined approaches are used to enhance the creativity of students by integrating creative thinking programs within all curricular areas.

If education, at whatever level, is to reach its own potential in helping human beings reach their potential, it must somehow come to terms with the creativity challenge. (Torrance, 1963). It is natural for man to learn creatively. Although relatively fewer people are generally known as being creative, it is a fallacy to think of creativity as a rare or magical process. Creativity as the emergence of original and individuality is not the exclusive preserve of poets, painters, musicians and scientists but a process that is within every human being. It is perhaps even essential to the life process itself.

Deliberate attempts at creative teaching can help persons to actualize their creative potential to meet the challenges of the life's demands.

The process-based nature of the present enhancement program affords immense scope in this direction.

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C H A P T E R - V I

S U M M A R Y   A N D   C O N C L U S I O N S

## CHAPTER - VI

### SUMMARY AND CONCLUSIONS

The present study was conducted with the intention of studying the effect of creativity enhancement intervention on the creative potential of students.

To achieve the objectives of the study, it was hypothesized that there may be no difference in the composite creativity scores, in the verbal creativity scores and in the non-verbal creativity scores before and after the intervention program, and further there may be no difference in the scores of the students on the fluency, flexibility and originality factors of creativity before and after the creativity intervention program.

For this purpose, a pretest-posttest experimental control group design was employed.

The data was collected from a sample of 68 male students, studying in class IX of a Hindi medium Government School of Delhi. The subjects were assigned randomly to experimental and control groups respectively. Both the treatment



group and the control group had thus 34 students each.

In an effort to enhance the creative thinking abilities of the students, instructional material in the form of activities were specially prepared by the Researcher following the procedure adopted by Passi (1989). There were 10 activities in all viz. brainstorming, fluency, flexibility, originality, hypothesizing, challenging assumptions, seeing problems, substitution, developing alternative perspectives and imagery and visualization.

Four subtests of the Passi's test of creativity were used, three of which were verbal viz. seeing Problems test, Unusual Uses test, and consequences test and one was a Non-Verbal test viz. Block test of Creativity. All these tests were administered before the start of the creativity intervention program and once again 3 months after the intervention program.

The results obtained are summarized as follows -

1. The analysis of covariance yielded a significant difference in the pretest-posttest composite creativity scores of the experimental group

indicating that the intervention program was effective in fostering the creative thinking abilities of the students.

2. The analysis of covariance revealed a significant difference in the pretest-posttest verbal creativity scores of the students in the experimental group, suggesting that the intervention program may be considered to have had a positive and significant effect in cultivating the verbal creativity of the students.
3. The analysis of covariance indicates that there is no significant difference in the pretest-posttest non-verbal creativity scores of the experimental group suggesting that the intervention program was not significantly effective in fostering the nonverbal creative thinking abilities of the students.
4. The covariance analysis for the fluency scores was statistically significant indicating that the creativity intervention program had a

significant positive effect in enhancing the fluency component of creativity.

Further analysis indicates that the enhancement program had a significant effect in the facilitation of verbal fluency whereas it was not significantly effective in enhancing the non-verbal fluency.

5. The covariance analysis indicates that there is a significant difference between the pretest-posttest flexibility scores of the students participating in the experimental group implying that the intervention program had a positive and significant effect on the flexibility scores of the students.

Further analysis shows that the creativity enhancement program had a significantly positive effect on the verbal flexibility component and was not significantly effective in fostering the nonverbal flexibility component of creativity of the students.

6. The analysis of covariance indicates that there is no significant difference in the pretest-posttest scores on the originality component of creativity.

Further analysis shows that the treatment had a significant effect on the enhancement of verbal originality and was not effective in enhancing the subjects' non-verbal originality factor.

These results were discussed in the light of available literature in the field.

#### LIMITATIONS

Despite the categorical findings that emerged out of this study, one may not be able to generalize these findings to school settings as a whole due to the following limitations -

1. The sample size was small and was limited only

to class IX students.

2. Another limitation was that Passi's test of creativity was used both as the pretest and posttest since parallel forms were not available.
3. The instructional material of the creativity enhancement program relied only on verbal activities in both training and practice.
4. Only one nonverbal test was used to assess the efficacy of the intervention program in enhancing the non-verbal creativity of the students.
5. The tasks that were included in the enhancement program were similar to those in the criterion test.
6. Generally, even though a person may have potential creativity, it may take a long time for it to emerge despite stimulating materials. However, in the present study the stimulation may be considered intense and explosive and

may be, this helped in the relatively quicker emergence of creative potential ability. If such emergence of creativity may take place with the criterion material and procedure is still to be explored.

#### SUGGESTIONS FOR FUTURE RESEARCH

Keeping the above limitations in view the following suggestions are made :

1. The effect of the creativity enhancement program on students studying in different classes may be studied.
2. Different tests may be used as pretest and posttest measures to overcome practice effects.
3. Incorporation of non-verbal activities in the instructional materials.

4. Tasks which are not similar to those in the criterion test, may be included in the creativity enhancement program.
5. Criterion-related validity may be established for the training programs facilitating creativity.

In addition to the above, the present study has shown certain areas for further research in the field of development of creativity which are as follows:

1. The influence of various student characteristics upon the success of creativity instructional programs may be explored.
2. The impact of various classroom organisations/ group dynamics on the effectiveness of creativity instructional programs may be investigated.
3. There has been more emphasis upon the cognitive aspects of creativity, rather than affective

or personality dimensions of creative talent. It would be profitable to investigate ways in which these non cognitive aspects of creativity might be enhanced, independently or in conjunction with the established cognitive instructional program.

4. The long term duration of the initial instructional effects may be studied.
5. The effect of the creativity enhancement program on students studying in different types of schools may also be studied.

Even though many of the above aspects could have been covered in the present study it was not possible due to lack of time. Despite not covering some of the above stated aspects, the present empirical investigation has been able to categorically demonstrate that creativity, especially verbal creativity, can be



enhanced through a properly and suitably devised intervention program. Perhaps a similar attempt for nonverbal aspect could be devised to ascertain its efficacy in the enhancement of creativity. This perhaps needs further exploratory research, both in the materials to be chosen and the procedures to be used for the purpose.

The present study has been successfully in not only highlighting what is further needed to enhance creative potential but has also been able to demonstrate how a suitably and adequately formulated intervention program could enhance creativity in children.

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B I B L I O G R A P H Y

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B I B L I O G R A P H Y  
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- Ackoff, R.L. & Vergara, E., (1983), 'Creativity in problem-solving and Planning', in Kuhn, R.L., (Ed)., Handbook for Creative and Innovative Managers, PP 77-89, McGraw Hill, New York, U.S.A.,
- Ahmed, S and Joshi, R.K. (1977) Effect of Socio-Cultural Disadvantage on Non-verbal Creative Thinking among School-going Children., Indian Journal of Psychology, 52 (4), 342-349.
- Albano, C (1987). The effects of an Experimental training program on the Creative Thinking Abilities of Adults. Dissertation Abstracts International, 48 (4), 869 - A.
- Alencar, E, Feldhusen, J.F. & Widlak, F.W. (1976) Creativity Training in Elementary Schools in Brazil, Journal of Experimental Education, 44 (4), 23-27.
- Anderson, H.H. (1959) Creativity as Personality Development. In Anderson, H.H. (ed) Creativity and its cultivation. Harper and Row, NYC, U.S.A.
- Asghar (1987) A comparative study of achievement motivation, Performance and creativity of destitute and non-destitute children of Ajmer Schools. Indian Psychological Review, 32 (3), 34-40.

- Asha, C.B. (1980) Creativity and Academic Achievement among secondary school children. Asian Journal of Psychology and Education, 6 (1), 1-4.
- Barron, F (1969) Creative person and Creative process. Holt, Rinehart and Winston, NYC, U.S.A.
- (1972) Artists in the making. Freeman, San Francisco, U.S.A.
- Bharadwaj, R (1985) Intelligence, sex and age as correlates of the components of creativity. Asian Journal of Psychology and Education, 16, 41-44.
- Bhaskara, S (1988) Effectiveness of Verbal Creativity Instructional materials, Perspectives in Education, 4 (2), 105-111.
- Bhattacharya, S.B. (1978) Interaction of personality and creativity. Unpublished Doctoral Dissertation, B.H.U. India.
- Biles, B.R. (1976) Creative Problem solving training for Graduate and professional students. Dissertation Abstracts International, 37, 4220 - A.
- Boutte, M.A. (1980). The effects of cognitive behaviour modification on enhancing creativity. Dissertation Abstracts International, 40 (11), 5783 - A.

- Burns, M.G. (1984). A comparison of three creative problem solving methodologies. Dissertation Abstracts International 45 (2), 341 - A.
- Catford, L.E. (1988) Creative problem solving in business: Synergy of thinking, intuiting, sensing and feeling strategies. Dissertation Abstracts International, 49 (1), 31 - A.
- Cherry, B.S. (1973) A strategy for developing creative thinking (Torrance model) in trainable mentally retarded children through a program of attention and concentration and open-ended methods. Dissertation Abstracts International, 33 (9), 4975 - A 4976 - A.
- Cohn, C (1985). Creativity training effectiveness - a research synthesis, Dissertation Abstracts International, 45 (8), 2501-A.
- Covington, M.V. Crutchfield, R.S. Davies, L.&Olton, R.M. (1972). The productive thinking program, OH: Charles E Merrill, Columbus, U.S.A.
- Covington, M.V. Crutchfield, R.S. (1965) Facilitation of creative problem solving. Programmed instruction, 4, 305.

- Cowington, N.R. (1968) Creativity in culturally deprived adolescent boys. Dissertation Abstracts International, 29(5), 1608-A.
- Cropley, A.J. & Feuring, E. (1971). Training creativity in young children. Developmental Psychology, 4 (1), 105.
- Crutchfield, R.S.(1962) Conformity and creative thinking, In Gruber, Terell, G & Wertheimer, H (eds) Contemporary approaches to creative thinking, Atherton, NYC, U.S.A.
- Deshmukh, M.N. (1979) An analytical study of some scholastic conditions and practices as contributory factors to creative ability. Unpublished Doctoral Dissertation, Nagpur University.
- Dharmangadan, B. (1981) Creativity in relation to sex, age and locale, Psychological studies, 26 (1), 28-33.
- D'Limia, C.D. (1981). Differential study of high and low achievement syndromes of a select group of creatively gifted and intellectually gifted children in the city of Bombay. Unpublished Doctoral Dissertation, Bombay University.

- Drevdahl, J.B. (1956) Factors of importance in creativity, Journal of Clinical Psychology, 12, 23-26.
- Eisner, E.W. (1964) Think with me about creativity, Omen Instructor Magazine Dansville, NY U.S.A.
- Feldhusen, J.F. Bahlke, S.J. and Treffinger, D.J. (1969) Teaching creative thinking. Elementary School; Journal, 70, 48-53.
- Feldhusen, J.F. & Clinkenbeard, P.R. (1986) Creativity Instructional Materials. A review of research Journal of Creative Behaviour 20 (3), 153-182.
- Feldhusen, J.F., Treffinger, D.J. AND Bahlke, S.J. (1970) Developing creative thinking. The Purdue Creativity program. Journal of Creative Behaviour. 4, 85-90.
- Fontenot, N.A. (1988) The effects of training in creativity and creative problem finding upon business people. Dissertation Abstracts International, 49 (1), 317A.
- Fultz, E (1981) The effect of an instructional program on the creative thinking skills, self concept and leadership of intellectually and academically gifted elementary students. Dissertation Abstracts International, 41 (7), 2931-A.

- Gakhar, S (1974). Creativity in relation to age and sex. Journal of Education and Psychology, 32(3), 133-139.
- Gallagher, J.J. (1985). Teaching the gifted child (3rd ed), M.A. Allyn and Bacon Inc. Boston, U.S.A.
- Garrett, H.E. (1979). Statistics in Psychology and Education, International Book Bureau, Hyderabad.
- Getzels, J. & Jackson, P (1962) Creativity and Intelligence. John Wiley and sons, New York, U.S.A.
- Ghiselin, B. (1954). The creative process, Berkeley, University of California.
- Gold, J.B. & Houtz, J.C. (1984) Enhancing the creative problem solving skills of educable mentally retarded students. Perceptual and motor skills, 58, 247-253.
- Goor, A & Rapport, T (1977). Enhancing creativity in an informal educational framework. Journal of Educational Psychology, 69 (5), 636-643.
- Gordon, S.C. (1980). The effects of a creative thinking skills program on fourth grade students. Dissertation Abstracts International 40(12), 6200-A.



- Griffith, T.J. (1988). An exploration of creating training for management students. Dissertation Abstracts International, 49 (3), 411-A.
- Guilford, J.P. (1967). The nature of human intelligence, Mc Graw-Hill, NYC, U.S.A.
- (1970). 'Traits of creativity', in Vernon, P.E. (ed) Creativity pp 167-188. Penguin Books, Middle sex, U.K.
- (1970). Creativity retrospect and prospect. Journal of Creative Behaviour, 4, 185.
- (1987). 'A review of a quarter century of progress, (1979) in Isaksen, S.G., (ed) Frontiers of Creativity research: Beyond the basics PP 45-61, Bearly Ltd, Buffalo, U.S.A.
- Gupta, A.K. (1980). A factorial study of verbal and non-verbal creativity, intelligence and socio-economic status, Model Institute of Education and Research (ISCCR Financed) Jammu.
- Gupta, A.K. (1981) Study of Parental preferences in relation to adolescents personality adjustment and achievement Model Institute of Education and Research (NCERT Financed), Jammu.

- Gupta, G.S. (1979). A comparative psychological study of creativity of Indian adolescent students at various educational levels, Indian Psychological Review 18 (1-4), 42-44.
- Gupta, M.S. (1977). Role of creativity in Engineering education. Indian Psychological Review.
- Harmon, W. & Fadiman, J. (1970) Selective enhancement of specific capacities through psycho-delic training. In Aaronson, B & Osmond, H. Psychedelics, Anchor, NYC, USA.
- Harre, R & Lamb, R (1986) The Dictionary of Developmental and Educational Psychology, Basil Blackwell Ltd.
- Houston, J. (1973) The Psychonaut program, an exploration into some human potentials. Journal of creative behaviour, 7, 253-278.
- Huber, J: Treffinger D; Tracy, D & Rand, D (1979). Self Instructional use of programmed creativity - Training materials with gifted and regular students. Journal of Educational Psychology, 71 (3), 303-309.

- Isaksen, S.G. (1987) Introduction : an orientation to the frontiers of creativity research, in Isaksen, S.G. (ed) Frontiers of creativity research beyond the basics, PP 1-26, Bearly Ltd. Buffalo, U.S.A.
- Isaksen, S.G. & Parnes, S.J. (1985) Curriculum planning for creative thinking and problem solving. Journal of Creative Behaviour, 19 (1), 1-29.
- Israeli, N.L. (1946). Studies in occupational analysis II: Originality. Journal of Psychology, 1946, 22, 77-87.
- Jabew, T.H. (1985) Effects of instruction on elementary - age students' productive thinking. Psychological Reports, 57, 900-902.
- Jarial, G.S. Verbal creative thinking among students with different socio-economic status backgrounds and birth order. (1979) Psycholingua 9(2), 85-90.
- (1981). An experiment in the training of nonverbal creativity. Journal of creative Behaviour, 15 (1).
- Jarial, G.S. & Sharma, A.K. (1980) Creativity and its components an affected by Intelligence, Personality and tgher interaction. Asian Journal of Psychology and Education 6(2) 26-32.

- Jhag, D.S. (1979) A study of personality correlates of creative children of 15 plus studying science subjects, Unpublished Doctoral Dissertation, Bhopal University.
- Johnson, M. (1983). The implementation and assessment of a set of learning experiences on enhancing creative attitudes in third, fourth and fifth grade elementary students. Dissertation Abstracts International, 43 (9), 2876-A.
- Joshi, D. & Joshi, K.K. (1986). Creativity as a function of Intelligence and self disclosure. Indian Journal of Applied Psychology. 23(1) 30-34
- Jung, C.G. (1928). Contributions to analytical psychology, Routledge & Kegan Paul, London.
- Katiyar, P.C. & Jarial, G.S. (1983). The role of sex in the enhancement of creativity among adolescents through a process oriented training program A study. Indian Educational Review, 18 (1) 40-46.
- (1985). Training Programs for developing creativity in school children. Journal of creative behaviour 19 (3), 219-220.

- Katiyar, P.C. & Jarial, G.S. Sansanswal, D.N. (1981).  
A study of the effects of SES and sex on the  
enhancement of verbal creative thinking abilities  
through creative developing program.  
Indian Journal of Psychology, 56, 155-164.
- Kaul, B. (1974) Construction and standardisation of a  
test to identify creative children in the age  
range of 14 to 16 years. Unpublished Doctoral  
Dissertation, M.S.U.
- Kavolis, V. (1964). Economic correlates of artistic  
creativity. American Journal of sociology. 70(3),  
332-341.
- Kealey, J.R. (1977). A study of the effects of training  
in creative problem solving on the creativity of  
student teachers of foreign languages and on the  
attitudes of their students, Dissertation Abstracts  
International, 37 (8), 5053. A
- Khatena, J. (1970). Training college adults to think creatively  
with words. Psychological Reports, 27, 279-281.
- (1971). A second study training college adults to think  
creatively with words. Psychological Reports 28, 385-386.

- Khatena, J. (1971) Teaching disadvantaged preschool children to think creatively with pictures. Journal of Educational Psychology, 62 (5), 384-386.
- Koestler, A. (1964) The act of creation. Macmillan, NYC, U.S.A.
- Kogan, N. & Pankova, E. (1974) Long-term Predictive validity of divergent-thinking tests: some negative evidence. Journal of Educational psychology, 66, 802-810.
- Kohler, W. (1925) The mentality of apes. Macmillan, New York, U.S.A.
- Korth, W.L. (1973) Training in creative thinking: The Effect on the individual of training in the "synectics" method of group problem solving. Dissertation Abstracts International, 33(8), 3947 - B.
- Kris, E. (1952) Psychoanalytic exploration in art, International university Press, N.Y.C., U.S.A.
- Kubie, L.S. (1958) Neurotic distortion of the creative process. University of Kansas, Lawrence, K.S., U.S.A
- Mackinnon, D.W. (1978) In search of human effectiveness, Creative education foundation, Buffalo, N.Y., U.S.A.

- Maltzman, Ii (1960) On the training of originality,  
Psychological Review, 67, 229-242.
- Mansfield, R.S., Busse Y.V. & Krepelka E.J. (1978)  
The effectiveness of Creativity Training  
Review of Educational Research, 48 (4)  
517-536.
- Maslow, A.H. (1959) Creativity in self actualizing  
people. In Anderson, H.H. (ed), Creativity  
and its cultivation, Harper and Row, N.Y.C.,  
U.S.A.
- Mednick, S.A. (1962) The associative basis of the  
creative process. Psychological Review,  
69, 220-232.
- Mehdi, B. (1973) Verbal test of creative thinking,  
Aligarh, Jawad Printing works.
- Mehdi, B. (1973) Nonverbal test of creative thinking,  
Aligarh, Jawad Printing Works.
- Mehdi, B. (1977) Creativity, intelligence and  
achievement: A correlational study.  
Psychological studies. 20 (1)

- Morgan, O.N. (1953) Creativity today. Journal of aesthetic art and criticism, 12, 24.
- Muddu, V. (1980). A study of some personality correlates of intelligence and creative abilities among high school students in Andhra pradesh. Unpublished Doctoral Dissertation, Osmania University.
- Nair, P.M. (1975). Personality characteristics of creative high school pupils. Unpublished Doctoral Dissertation, Kerala University.
- Nathawat, S.S. (1977) A study of creativity in relation to mental health. Unpublished Doctoral Dissertation Kurukshetra University.
- National Policy on Education (1986) - Ministry of Human Resource Development, Government of India, New Delhi.
- Nirpharake, A.M. (1977) An experiemntal study of some methods of training in creativity. Unpublished Doctoral Dissertation, Poona University.
- Osborn A. (1963) Applied imagination. Scribæers, N.Y.C.,U.S.A.



- Pandey, R.C. & Pandey, R.N. (1984) A study of creativity in relation to sex of high school students. Indian Psychological Review, 26 (2), 53-57.
- Paramesh, C.R. (1970). A study of creativity in relation to extraversion, emotionality, body-image and values. Unpublished Doctoral Dissertation, Madras University.
- Parnes, S.J. (1967) Methods and educational programs for stimulating creativity a representative list. Journal of Creative Behaviour, 2, 71-75.
- (1971) Creativity: Developing human potential. Journal of Creative Behaviour, 5 (1), 19-36.
- Parnes, S.J. & Brunelle, E.A. (1967) The literature of creativity. Journal of Creative Behaviour, 1, 52-109.
- Parnes, S.J. & Meadow, A. (1959) Effects of brainstorming instructions on creative problem-solving by trained and untrained subjects. Journal of Educational Psychology, 50, 171-176
- Parnes, S.J., Noller, R.B. & Biondi, A.M. (1977) Guide to creative action. Charles Scribner's Sons, N.Y.C., U.S.A.

- Qureshi, A.N. (1980) A study of creativity in relation to intelligence, manifest anxiety, and level of aspiration of high school girls, Unpublished Doctoral Dissertation, Agra University.
- Raina, M.K. (1971) Verbal and nonverbal creative thinking ability : A study of sex difference. Journal of Education and Psychology, 29 (3), 125-180.
- Raina, M.K. & Chaturvedi, S. (1970) Effects of training in Creative Problem Solving on Fluency of thinking Indian Journal of Applied Psychology, 7 (2) 71-74.
- Ramachandrachar, K. (1975) A study on creativity-evolving a test to identify children with creative ability at the school-leaving age. Unpublished Doctoral Dissertation, M.S.U.
- Rawat, M.S. & Agarwal, S. (1977). A study of creative thinking (with reference to intelligence, age, sex, communities and income group). Indian Psychological Review, 14 (2), 36-40.
- Reddy, A.V.R. & Reddy, P.B. (1983) Creativity and intelligence. Psychological studies, 28(1),20-24.

- Reese, H. Parnes, S; Treffinger, S.D.; & Kaltsounis, G. Effects of a creative studies program on Structure of Intellect factors. Journal of Educational Psychology, 68, 401-410.
- Ripple, R.E. & Dacey, J.S. (1967) The facilitation of problem solving and verbal creativity by exposure to programmed instruction. Psychology in the schools, 4, 240-245.
- Rogers, C. (1959) Toward a theory of creativity, in Anderson H.H. (ed) Creativity and its cultivation PP 69-82, Harper & Bros, New York, U.S.A.
- Rose, L.H. & Lin, H. (1984). A meta-analysis of long-term creativity training programs. Journal of Creative Behaviour, 18 (1), 11-22.
- Sansanwal, D.N. Sathe, S., Jarial, G.S. (1980) Facilitation of creative thinking abilities through transcendental meditation Journal of Indian Education, Sept.1980 9-13.
- Schuler, G. (1974) The effectiveness of the productive thinking program. Paper presented at the Annual meeting of the American Educational Research Association, Chicago, IL, U.S.A.

- Seetharam, R. & Vedanayagam, EG (1979). Creativity and socio-economic status. Journal of the Institute of Educational Research, 3 (2), 35-37.
- Shackel, D.S.J. & Lawrence, P.J. (1969). Improving creativity through programmed instruction, New Zealand Journal of Educational studies, 4, 41-56.
- Shaklee, B.D. (1986) The effectiveness of teaching creative problem solving techniques to enhance the problem solving ability of Kindergarten students. Dissertation Abstracts International, 46 (10).
- Sharma, K.N. (1980) Basic issues regarding relationship between Intelligence and creativity. Studies in Psychology, 8-15.
- Shean, J.M. (1977) The effect of training in creative problem solving on divergent thinking and organisational perceptions of students of school administration. Dissertation Abstracts International, 38, 585-A.
- Shivley, J.E., Feldhusen, J.F. & Treffinger, D.J. (1972) Developing creativity and related attitudes,. Journal of Experimental Education, 41, 63-69.

- Shukla, J.P. (1980) Conservation and scientific creativity through cultures during the period of formal operation. Unpublished Doctoral Dissertation, R.S.U.
- Singh, R.P. (1979) A study of creativity in relation to adjustment, frustration and level of aspiration. Unpublished Doctoral Dissertation Agra University.
- Singh, R.B., Mathur, S.R. & Saxena, S. (1977) Creativity as related to intelligence, achievement and security - insecurity. Indian Psychological Review 14 (1), 84-86.
- Speedic, SM, Kreffinger, D.J. & Feldhusen, J.F. (1971) Evaluation of components of the Purdue Creative Thinking Programme. A longitudinal study. Psychological Reports, 29, 395-398.
- Sporburg, A (1971). The effect of programmed productive thinking materials on the divergent and convergent test scores of sixth grade students. Paper presented at the annual meeting of the American Educational Research Association, N.Y.C., U.S.A.
- Sreelatha, V.N. & George, M. (1981) Effect of Creative teachings on creative thinking of adolescents. Indian Psychological Review, 20 (3), 19-24.

Srivastava, B. (1982) A study of creativity in relation to personality factors, birth order and linguistic ability among the high school students. Unpublished Doctoral Dissertation, Avadh University.

Srivastava, S.S. & Jha, J. (1977) Creativity and academic group differences among high school students. Indian Psychological Review, 14 (2), 41-43.

Stein, M. (1953) Creativity and culture. Journal of Psychology, 36, 311-322.

Tannenbaum, A.J. (1983) Gifted children. Psychological and educational perspectives. N.Y.C., U.S.A.

Taylor, C.W. (1988) 'Various approaches and definitions of creativity' in Sternberg, R.J. (ed) The nature of creativity : Contemporary psychological perspectives, PP 99-121, Cambridge University Press, New York, U.S.A.

Torrance, E.P. (1962) Guiding creative talent. Prantice Hall, N.J., U.S.A.

(1963) Education and the creative potential . University of Minnesota Press, Minneapolis, U.S.A.

- Torrance, (1972) Predictive validity of the Torrance Tests of creative thinking. Journal of Creative Behaviour, 6(4), 236-252.
- (1974) Torrance Tests of Creative thinking, M.A., Ginn/Personal Press, Laxington, U.S.A.
- Torrance, E.P. & Torrance, P (1972). Combining Creative problem solving with creative expressive activities in the education of disadvantaged young people. Journal of creative Behaviour, 6(1), 1-10.
- Toynbee, A. (1964) Is America neglecting her creative minority?; in Taylor C.W., (ed). Widening horizons in creativity, PP 3-9, Wiley Press, New York.
- Treffinger, D.J. (1980) Encouraging creative learning for the gifted and talented. Ventura, U.S.A.
- Treffinger, D.J. & Ripple, R.E. (1969) Developing creative problem solving abilities and related attitudes through programmed instruction. Journal of Creative Behaviour, 3, 105-110.
- Treffinger, D.J & Ripple, R.E. (1971) Programmed instruction in creative problem solving, Educational Leadership, 28, 267-275.

- Treffinger, D.J., Speedie, S.M. & Bruner, W.D. (1974).  
Improving children's creative problem solving  
ability. The Purdue creativity Project.  
Journal of Creative Behaviour, 8, 20-30.
- Tweet, C. (1980). The effects of the implementation  
of creativity training in the elementary school  
social studies curriculum. Dissertation Abstracts  
International, 41(3), 1017-A.
- Veeraraghavan, V. (1990). A study of Bal Bhavan Intervention  
in enhancement of creativity. Unpublished  
Report submitted to Bal Bhavan society of India,  
New Delhi.
- Veeraraghavan, V. & Samal, A.K. (1989) Structured training  
Program as an intervention in enhancing  
creativity in children. Perspectives in education  
5 (4) 249-254.
- Wallach, M.A., & Kogan, N (1965) Modes of thinking in young  
children, Rinehart & Winston, Holt, New York.
- Wallas, G. (1926) The art of thought. Harcourt, Brace,  
N.Y.C., U.S.A.



Wardrop, J.L., Olton, R.M., Goodwin, W.C., Covington, M.V.,  
Klausmeur, H.J. Crutchfield, R.S. & Ronda, T.  
The development of productive thinking skills  
in fifth grade children. Journal of Experimental  
Education, 37, 67-77.

Weil, A. (1972) The natural mind. Houghton - Mefflin,  
Boston, U.S.A.

Wertheimer, M. (1945) Productive thinking. Harper & Row,  
N.Y.C. U.S.A.

Woodcliffe, H.M. (1970) A study of change in the creative  
thinking ability of grade V children. Unpubli-  
shed doctoral dissertation, University of  
Toronto, Canada.

A P P E N D I C E S

डॉ० बी० के० पासी

## निर्देश-पुस्तिका

### सामान्य निर्देश

१. यह परीक्षण-माला तुम्हारी सृजनात्मक योग्यता का निर्धारण करने के लिये दी जा रही है जिसका अर्थ उस योग्यता को जानने से है जो कि समस्याओं के नये हल एवं अर्थ ढूँढने में सहायता करें।
२. कृपया प्रत्येक उप-परीक्षण को ध्यानपूर्वक एवं गम्भीरता से करें।
३. परीक्षण के सभी भाग रोचक हैं तथा तुम्हें कार्य करने में प्रसन्नता का अनुभव होगा।
४. प्रत्येक परीक्षण के लिये विशिष्ट निर्देश अलग-अलग इस पुस्तिका में दिये जा रहे हैं।

Est. : 1971

Phone : 65780

नेशनल साइकलॉजिकल कारपोरेशन

4/230, कचहरी घाट, आगरा - 282004 (उ० प्र०)

## ।-समस्यायें जाँचने का परीक्षण

जब मैं नीचे लिखे आदेशों को आपके सामने पढ़ूँ तो कृपया आप भी उन्हें चुपचाप पढ़ें :-

१. उत्तर-पुस्तिका के पृष्ठ २ एवं ३ पर चार भिन्न कोष्ठ बने हुये हैं। प्रत्येक कोष्ठ (खाली स्थान) के ऊपर एक साधारण वस्तु का नाम लिखा हुआ है। इन वस्तुओं का प्रयोग करते समय आपके सामने इनसे सम्बन्धित बहुत से दोष और समस्यायें आ सकती हैं; अतः आप ऐसे अधिक से अधिक दोषों तथा समस्याओं के बारे में सोचें तथा संक्षिप्त रूप में लिखें।
२. सम्पूर्ण परीक्षा में ४ प्रश्न हैं और कुल समय ८ मिनट है। आप अपनी इच्छा के अनुसार प्रत्येक प्रश्न को उचित समय दे सकते हैं तब भी आपको समय की जानकारी करवाने के लिये प्रत्येक दो मिनट के पश्चात् मौखिक संकेत दिया जाएगा।
३. मेरे यह कहने पर कि "समय समाप्त हो गया है" कृपया लिखना बन्द कर दें।
४. प्रत्येक वस्तु से सम्बन्धित दोष तथा समस्यायें नीचे दिए उदाहरण की भाँति लिखें।

उदाहरण :-

वस्तु : टाइम पीस	
क्रम-संख्या	दोष तथा समस्यायें
१.	जंग लग जाता है।
२.	शोर करता है।
३.	आसानी से टूट जाता है।
४.	चाबी देनी पड़ती है।
५.	गिर जाता है।
...	.....
...	.....

ये दोष तथा समस्यायें टाइम पीस से सम्बन्धित हैं। आप इसी प्रकार उत्तर-पत्रिका में दी गई वस्तुओं के दोष तथा समस्यायें सोचें और संक्षिप्त रूप में लिखें।

५. यदि आपने कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।

६. जब तक आपको कहा न जाये परीक्षा आरम्भ न करें।

## II-असाधारण प्रयोग का परीक्षण

जब मैं नीचे लिखे आदेशों को आपके सामने पढ़ूँ तो आप भी इन्हें चुपचाप पढ़ें :-

1. उत्तर-पुस्तिका के पृष्ठ ४ पर दो कोष्ठ हैं; प्रत्येक कोष्ठ के ऊपर एक साधारण वस्तु का नाम लिखा है। इन वस्तुओं का प्रयोग विभिन्न ढंगों से विविध रूप में किया जा सकता है। आप प्रत्येक वस्तु के अधिक से अधिक मौलिक, असाधारण और मनोरंजक प्रयोग लिखें। आप वस्तु को किसी भी परिमाण, आकार व रंग का मान सकते हैं।
2. ध्यान रहे कि आपने ऐसे असाधारण प्रयोग लिखने हैं जिसके विषय में आपकी कक्षा में कभी किसी ने सोचा भी न हो। आप अपनी योग्यता के अनुसार अधिक प्रयोग लिखें।
3. सम्पूर्ण परीक्षा में दो प्रश्न हैं और ८ मिनट का समय है। आप अपनी इच्छा के अनुसार प्रत्येक प्रश्न को उचित समय दे सकते हैं। तब भी आपको समय की जानकारी करवाने के लिये प्रत्येक ४ मिनट के पश्चात् मौखिक संकेत दिया जायेगा।
4. मेरे यह कहने पर कि "समय समाप्त हो गया है" कृपया लिखना बन्द कर दें।
5. प्रत्येक वस्तु के प्रयोग नीचे लिखे उदाहरण की तरह लिखें।

उदाहरण :-

वस्तु : दियासलाई	
क्रम-संख्या	प्रयोग
१.	खिलौने बनाना
२.	पटाखे बनाना
३.	गिनती सीखना
४.	मापने का अंक
५.	ब्लेड आदि छोटी वस्तु रखना
...	.....
...	.....

ये सभी प्रयोग असाधारण और अर्थपूर्ण हैं। इसी प्रकार उत्तर-पत्रिका में दो गई अन्य वस्तुओं के असाधारण प्रयोग सोचें और लिखें।

6. यदि आपको कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।
7. जब तक आपको कहा न जाये परीक्षा आरम्भ न करें।

### III-परिणाम वरीक्षण

जब मैं नीचे लिखे आदेशों को आपके सामने पढ़ूँ तो कृपया आप भी उन्हें चुपचाप पढ़ें :-

1. उत्तर-पुस्तिका के पृष्ठ ५ एवं ६ पर चार कोष्ठ बने हुए हैं। प्रत्येक कोष्ठ के ऊपर एक असम्भव कथन लिखा हुआ है। मान लो इन कथनों में बताई गई घटनायें अचानक रूप से वास्तविक हो जाती हैं, तब इनसे विभिन्न प्रकार के परिणाम होंगे। आपको प्रत्येक कथन से सम्बन्धित बहुत से परिणाम सोचने चाहिये। आपके सोचे परिणाम प्रत्यक्ष और अप्रत्यक्ष दोनों ही प्रकार के हो सकते हैं।
2. प्रत्येक कथन में बताई गई घटनाओं के अधिक से अधिक परिणाम लिखने की चेष्टा करें।
3. सम्पूर्ण परीक्षा में चार प्रश्न हैं और ८ मिनट का समय है। आप अपनी इच्छा के अनुसार प्रत्येक प्रश्न को उचित समय दे सकते हैं। तब भी आपको समय की जासूसी करवाने के लिये प्रत्येक दो मिनट के पश्चात् मौखिक संकेत दिया जायेगा।
4. मेरे यह कहने पर कि "समय समाप्त हो गया है" कृपया लिखना बन्द कर दें।
5. प्रत्येक कथन के परिणाम नीचे लिखे उदाहरण की भाँति लिखें।

उदाहरण :-

कथन : यदि पृथ्वी की आकर्षक शक्ति नष्ट हो जाये।

क्रम-संख्या	परिणाम
१.	पृथ्वी पर कुछ वापिस नहीं आ सकता।
२.	कोई चल नहीं सकता।
३.	मानव पृथ्वी पर नहीं रह सकता।
४.	ज्वार-भाटा नहीं आ सकता।
...	.....
...	.....

ये परिणाम पृथ्वी की आकर्षक शक्ति के नष्ट होने पर होंगे। इसी प्रकार आप उत्तर-पत्रिका में दिए हुए कथनों में वर्णित घटनाओं के परिणामों के विषय में सोचें और संक्षिप्त रूप में लिखें।

6. यदि आपने कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।
7. जब तक आपको कहा न जाए परीक्षा आरम्भ न करें।

## IV-प्रश्नात्मक योग्यता परीक्षण

जब मैं नीचे लिखे आदेशों को आपके सामने पढ़ूँ तो आप भी कृपया उन्हें चुपचाप पढ़ें :-

१. आपके सामने अध्यापक की मेज पर कुछ चीजें ढकी हुई रखी हैं। आप इनके विषय में जानने के लिए बहुत उत्सुक होंगे तथा बहुत से प्रश्न सोच रहे होंगे। आओ हम देखें कि जब मैं इनके ऊपर से कपड़ा उठा दूँ तो आप इनके विषय में कितने भिन्न-भिन्न प्रकार के प्रश्न लिख सकते हैं।
२. उत्तर-पुस्तिका के पृष्ठ ७ पर कृपया अपने प्रश्न संक्षिप्त रूप से लिखें।
३. आप किसी भी प्रकार के प्रश्न लिख सकते हैं परन्तु प्रत्येक प्रश्न भिन्न-भिन्न प्रकार का तथा स्वतन्त्र होना चाहिए। कृपया यह भी ध्यान रहे कि आपके प्रश्नों का उत्तर साधारण जाँच से नहीं दिया जा सकता।
४. परीक्षा के लिए कुल ६ मिनट हैं। मेरे यह कहने पर कि "समय समाप्त हो गया है" आप लिखना बन्द कर दें।
५. यदि आपने कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।
६. जब तक आपको कहा न जाए परीक्षा आरम्भ न करें।

## V-वर्ग पहली परीक्षण

जब मैं नीचे लिखे आदेशों को ऊँचे स्वर में पढ़ूँ तो कृपया आप भी उन्हें ध्यानपूर्वक पढ़ें :-

१. जो लिफाफा आपको दिया जा रहा है उसमें ५ त्रिकोन ( $\triangle$ ) और ५ चतुर्भुज ( $\square$ ) आकार के प्लास्टिक के बने टुकड़े हैं। इन सभी १० टुकड़ों की सहायता से आप एक वर्ग ( $\square$ ) बनाने का प्रयत्न करें। ध्यान रहे कि बनाये हुये वर्ग के बीच न कोई खाली स्थान है और न ही कोई टुकड़ा किसी दूसरे टुकड़े पर रखा गया है। वर्ग बनाने के बहुत से भिन्न-भिन्न हल हैं; आप अपनी इच्छा के अनुसार जितने भी चाहें हल ढूँढ़ सकते हैं।
२. ज्यों ही आप सफलतापूर्वक या असफलतापूर्वक परीक्षा समाप्त कर लें कृपया मुझे संकेत देने के लिये हाथ उठाये। मैं आपके पास आऊँगा तब आप जो चाहे पूछ सकते हैं या कह सकते हैं। कृपया ध्यान रहे कि आप न कुछ ऊँचा पूछेंगे और न ही ऊँचा बतायेंगे।
३. अन्त में प्लास्टिक के १० टुकड़े लिफाफे में डालकर मुझे लौटा दें।
४. परीक्षा का कुल समय ३ मिनट है परन्तु यदि आपका मन चाहेगा तो मैं शायद आपको हल ढूँढ़ने के लिये और भी समय दे दूँ।
५. यदि आपने कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।
६. जब तक आपको कहा न जाये परीक्षा आरम्भ न करें।

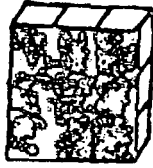


## VI-ब्लॉक परीक्षण

कृपया नीचे लिखे आदेशों को ध्यानपूर्वक पढ़िये :-

- यह परीक्षा आपकी सृजनात्मक योग्यता मापने के लिए है। आपके सामने एक डिब्बे में एक समान १६ घन और १२ अर्धघन हैं तथा एक लकड़ी का तख्त है प्रत्येक ब्लॉक की सतह (Surface) भिन्न-भिन्न रंग से रंगी हुई हैं।
- आप इन ३१ ब्लॉक की सहायता से जितनी चीजें सम्भव हों लकड़ी के तख्त पर रखकर बनायें। आप एक समय में सभी ब्लॉक या उनके कुछ भाग का प्रयोग कर सकते हैं। कृपया आप अधिक से अधिक से मौलिक, रोचक और अर्थपूर्ण उन चीजों को बनाने का प्रयत्न करें जो कि आपके विचार में आपकी कक्षा का कोई अन्य विद्यार्थी न बना सके। आप अपनी बनाई हुई चीजों के नमूने और ढाँचों की रंग योजना और आकार का ध्यान रखें।
- आप प्रत्येक बनाई हुई चीज का उचित नाम उत्तर-पत्रिका के पृष्ठ आठ पर लिख दें।
- आप एक समय में केवल एक ही तख्त और एक ही ब्लॉक का डिब्बा प्रयोग करें। जब आप एक नमूना या ढाँचा तख्त पर बना लें तो वह मुझे देखने के लिये दे दें। तभी आप एकदम दूसरे ब्लॉक के डिब्बे और तख्त से काम करना आरम्भ कर दें। जब तक मैं आपको रुकने के लिए न कहूँ आप अपना काम इसी प्रकार जारी रखें।
- सम्पूर्ण परीक्षा का समय १० मिनट है।
- आप अधिक से अधिक चीजों के सम्भव नमूने तथा ढाँचे बनाने का प्रयत्न करें।
- नीचे दिये उदाहरणों में ब्लॉक के साथ काम करने की विधि बताई गई है।

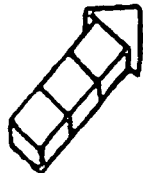
उदाहरण (क)



Black Board  
श्याम-पट

उदाहरण (क) में ६ घनों की सहायता से आपके सामने एक ब्लैक-बोर्ड बनाया गया है। ध्यान से देखें कि रंग योजना अर्थपूर्ण है। ढाँचा श्याम-पट की तरह दिखाई देता है।

उदाहरण (ख)



Arrow  
तीर

उदाहरण (ख) में तीन घनों और एक अर्धघन की सहायता से तीर का निशान बनाया गया है। ध्यान से देखें कि रंग योजना अर्थपूर्ण है और ढाँचा तीर की तरह है।

याद रहे कि आप हर ब्लॉक को अपनी इच्छा के अनुसार जैसे भी चाहें रख सकते हैं; आपको इसमें पूरी स्वतन्त्रता है।

- अपनी बनाई हुई चीजों या उदाहरणों में दी हुई चीजों के नमूने व ढाँचे दोबारा न बनायें।
- यदि आपको कुछ पूछना हो तो अभी परीक्षा आरम्भ होने से पहले ही पूछ लें।
- जब तक आपको कहा न जाये परीक्षा आरम्भ न करें।

# Answer Book of P. T. C.

Please fill up the following informations (कृपया निम्न सूचनायें भरें) :—

Name (नाम).....

Sex (लिंग)..... Age (आयु)..... Class (कक्षा) .....

School/College (विद्यालय).....

Father's/Guardian's occupation (पिता/संरक्षक का व्यवसाय).....

Income (आय)..... Date (दिनांक).....

## FOR EXAMINER'S USE ONLY

Test No.	Code No.	Remarks
I	F	
	F	
II	X	
	O	
	C	
	C	
III	F	
	O	
	C	
IV	F	
V		
VI	F	
	X	
	O	
	C	

# I. Seeing Problems Test (समस्यायें जाँच परीक्षण)

I. Object—SHOES (जूते)	II. Object—PEN (पैन)
S. No. Defects and Problems (दोष और समस्यायें)	S. No. Defects and Problems (दोष और समस्यायें)
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
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III. Object—CHAIR (कुर्सी)	IV. Object—POST CARD (पोस्ट-कार्ड)
S. No. Defects and Problems (दोष और समस्यायें)	S. No. Defects and Problems (दोष और समस्यायें)
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
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## II. Unusual Uses Test (असाधारण प्रयोग परीक्षण)

I. PIECE OF CLOTH (कपड़े का टुकड़ा)		II. Object—BOTTLE (बोतल)	
S. No.	Uses (प्रयोग)	S. No.	Uses (प्रयोग)
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
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### III. Consequences Test (परिणाम परीक्षण)

I. Statement— If human beings start flying like birds. (यदि पक्षियों की तरह मानव भी उड़ना प्रारम्भ कर दें तो)		II. Statement— If all houses start flying. (यदि सभी घर उड़ना शुरू कर दें तो)	
S. No.	Consequences (परिणाम)	S. No.	Consequences (परिणाम)
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
....		....	
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....		....	



#### **IV. Test of Inquisitiveness (प्रश्नात्मक योग्यता परीक्षण)**

S. No.

QUESTIONS (प्रश्न)

1

2

3

4

5

6

7

8

9

10

#### **V. Test of Square Puzzles (वर्ग पहेली परीक्षण)**



## VI. Blocks Test of Creativity

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

	Write the name of the products (उत्पादनों के नाम लिखें)	Remarks		Write the name of the products (उत्पादनों के नाम लिखें)	Remarks
1			9		
2			10		
3			11		
4			12	b	
5			13		
6			14		
7			15		
8					