CHAPTER VI

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6.0 Introduction

The story of civilization from stone-age to the space-age is the story of man's creativity. Every era is full of the diversified stories of creativity and these have resulted in bringing about many transmutations every now and then. The fact that a phenomenon so profound as creativity, which has always contributed in changing the course of history, mode of life, pattern of society, built civilizations, gave ~~it~~ us towering figures in all human spheres, and urged human species to open the doors of space technology, should capture the attention of psychologists and educationists is not surprising. What is astonishing is the fact that how it has managed to escape their attention for so long. However, the efforts to understand creative thinking started in the first quarter of this century. Chassel, Graham Wallas and Hutchinson were among the earliest to make an attempt in the intriguing field of creativity. During the second half of the present century creativity emerged as one of the most fascinating subjects of investigation and area of concern among both psychologists and educationists.

In the past creativity was thought of, as a hereditary trait of few persons, the ability of talented people for contributing something new and enduring to the culture. Emphasis was laid on extraordinary, and its manifestation in the selected

few. Even in the twentieth century literature there are indications of conviction that very few people are endowed with creative ability and it is a rare experience accessible only to genius. Today, however scientific researchers gave us an idea that all are born with creative potential in every age. It knows no special time, no place, no medium and no person. This view is supported by Taylor (1964) as 'all persons, regardless of age or culture are to some degree creative'. Now the concept of creative thinking is not a new one; and numerous research works have been published in foreign countries.

Very recently, the emphasis in education has been shifted in favour of the development of creative thinking. Taylor and Williams (1965) suggested that 'it is hightime that creativity should become one of the major objectives of education'. Moreover Taylor (1964) has aptly pointed out, 'because creative acts affect enormously not only scientific progress but society in general; those nations who learn best to identify, develop and encourage the creative potential in their people may find themselves in very advantageous position'. In fact, the very future of any nation today depends on how well it has trained its young ones to think creatively. Singh (1978) rightly indicated that 'there cannot be any denying fact that the progress, a country has made in different walks of life - economic, social, cultural, political and even religious and spiritual is mainly the result of creative energies of its people.

But unfortunately, in our country, we find creative youngsters in our kindergartens but conformers in our high schools. Even today we failed to provide ample opportunities for them, though we know, the failure on our part to benefit from their excellent contributions to the society in general might prove detrimental to our nation's future. Hence every educator as proponents of creativity must seriously think today of how to nurture our precious creative talent in schools. However, increasing interest and activity have opened many avenues of research in this area. It is in this context that the present study attempts venture to study the possibilities of teaching for development of creative thinking with some common used strategies among school students. The present investigator strongly agrees with Raina's (1975) opinion that 'research in creativity is not a luxury that can wait till better time'.

6.1 Needs of The Study

The river is considered as nurturer of mankind. We know it as a 'Lok-Mata'. But, at the time of flood, it can also become an enraging destructive force. However, if it is controlled by constructing dam and channels it becomes a boon and a helping hand in the progress and uplift of the country.

So is the case with the creativity. If it is nurtured properly, it becomes a constructive force or else it becomes destructive. The need of enhancement of creativity of students seems hardly necessary to recapitulate, as it is stark and self-

evident truth for every developing nation, if it wishes to contribute to the world culture and thereby to have its prideful place in the comity of nations. Hence to guide and promote creative talent among our pupils is an accepted goal of education today. The role of educators in this new context is very important to realise changing demands of education. It is also truism to say that at no other time in man's history, the need for understanding and developing the creative thinking of children has been felt so great as it is now. Here is the terrifying challange of our age to educationists. This means that we all have to make our little attempts to define, identify, measure and promote creative thinking of the pupils with enthusiasm, in our limited sphere of influence, to meet this challenge. We know that, unused natural resources like minerals, will remain as such without being exploited if left unutilised, but human resources are wasted if left unrealised, untrained and unutilised properly and if properly utilised it becomes the wealth of the country. Reinforced by such a high value of creativity researchers have taken interest in this field. But a cursory glance at the studies of creative thinking reveals that inspite of many attempts, only a partial coverage is there. The second survey of Research in Education (1980 :edited by Dr.Buch) reports a few studies in this area and it shows that very little has been done by the way of experimentation with

creative training procedure and nothing substantial has been reported about the effects of common strategies of teaching on the development of creative thinking. Even the studies abroad reveal that many attempts have been made there to find out the effects of special models, programmes and strategies, but a comprehensive picture of the effects of some common teaching strategies is still to be obtained. All these suggest that the work is needed to help creative talent and to develop the guiding principles for teachers also for promoting creative thinking and it requires extensive scientific investigations particularly in this area of research. Hence the investigator felt a strong need for comprehending the problem and this study is a planned attempt in this direction with the hope that some worthwhile results may become available to educators particularly teachers in the development of creative thinking with the aid of common teaching strategies.

6.2 Statement of the Problem

On the basis of the foregoing discussions the problem has been stated as :

'An Experimental Investigation of the Effects of Selected Teaching Strategies on the Development of Creative Thinking and Achievement in Science.

6.3 Explanation of The Terms

(a) Teaching Strategies : Smith (1967) considers that a strategy is a way of looking at the activities involved in class

room discourse. It refers to set of verbal actions that serves to attain certain results and to guard against others.

Hough and Duncan (1970) define a strategy, as a pattern of substantiative, managerial, or silent behaviour used to facilitate students attainment of objectives.

For the purpose of this study the term teaching strategy has been used as the way in which the teacher handles a classroom situation in order to facilitate learning. The different components included were lectures, discussions, practical works and use(of A.V. aids as per requirement of the study.

(b) Creative Thinking : Investigations have shown that there are two distinct modes of thinking, one referred to as convergent thinking (i.e. intelligence) and the other called divergent thinking (i.e. creativity). When we develop, organise and recognise ideas, objects or words and arrive at a product which is novel, original, unexpected and imaginative in its new form, we are thinking creatively.

Definitions of creative thinking are many, ranging from those characterizing it as simple problem solving to those that emphasize the full realization and expression of one's unique potentialities. In this study investigator has accepted creative thinking in its broadest sense. If the product produced by the pupils, is new to them, not necessarily to others, the pupils are considered creative. The components measured were fluency, flexibility and originality only.

6.4 Objectives

The study was started with the intention to know the relative effectiveness of the four different teaching strategies namely (i) Strategy (St_1) i.e. Lecturing (ii) Strategy (St_2) i.e. Lecturing + Discussion (iii) Strategy (St_3) i.e. Lecturing+Discussion+Practical Works and (iv) Strategy (St_4) i.e. Lecturing + Discussion + Practical Works + Use of A.V.aids; upon pupils achievement and creative thinking.

The objectives of the study were :

(i) To find out the effectiveness of the strategies - St_1 , St_2 , St_3 and St_4 on the development of creative thinking ability of standard VIIth pupils.

(ii) To find out the effectiveness of the strategies St_1 , St_2 , St_3 and St_4 on the achievement in science of standard seventh pupils.

These objectives were fulfilled by employing Latin Square Design.

6.5 Hypotheses

Keeping in view, the framework of the study, resulting from the critical review of related literature, the problem and the objectives, some of the following null hypotheses have been formulated :

1. There will be no significant difference between strategies St_1, St_2, $St_3$and St_4 for promoting creative thinking in the pupils of seventh class.

2. There will be no significant difference between Strategies st_1, St_2, St_3 and St_4 for the achievement scores of the seventh class pupils in Science.

3. There will be no significant difference between Strategies St_1, St_2, St_3 and St_4 for the development of creative thinking in high or low achievers.

4. There will be no significant difference between Strategies St_1, St_2, St_3 and St_4 for the development of creative thinking in pupils having high or low intelligence.

5. There will be no significant difference between strategies St_1, St_2, St_3 and St_4 for the development of creative thinking in either boys or girls.

6. There will be no significant difference between Strategies St_1, St_2, St_3 and St_4 for developing creative thinking among high or low creative pupils.

6.6 Delimitations

The study was delimited to the following aspects :

1. Teaching is a wide concept and involves a large number of variables, out of which only four variables viz., Lecturing, Discussion, Practical work and A.V. aids were used for developing four teaching strategies.

2. The investigator has used only verbal tests for measuring creative thinking.

3. Creative thinking was represented by fluency, flexibility and originality only.

6.7 Planning and Procedure

As it has been stated earlier the present study is an experimental investigation. It aimed at studying the effects of

the four selected strategies of teaching upon creative thinking and achievement of seventh class pupils in Science. Data were collected keeping in the mind the objectives and hypotheses of the study, by conducting an experiment on the seventh class pupils of the secondary school of PETLAD. The experiment was carried out for fourteen weeks in the year 1978. Table below gives a brief picture of the experiment.

Table :6.1: A Brief Picture of the Experiment

Design	Units of Teaching	Treatment Variables	Group of Pupils	Duration of Experiment	Tests	Other Tests
4 X 4 Latin Square Design	Four	Four	Four	Four sessions (Total 14 Weeks)	1.Achievement Tests (Four) 2,Creative Thinking Tests (Four)	1.I.Q.Test 2.T.T.C.T. 3.Pre-achievement Test

Highlights from the Table :

* The 4 X 4 Latin Square Design was followed for the purpose of the experiment.
* There were four teaching strategies and to fit them into the design, four groups of pupils and four units of teaching were taken up and after completing each unit corresponding tests were administered.

* In addition to criterion tests, the Torrance Test of Creative Thinking (TTCT), Bhatt's I.Q. Test and Pre-Achievement Test were administered to describe the sample.

* Each group has been exposed to all units, all strategies and all teachers.

Details regarding the design of the experiment, the sample on which it was conducted, the tools that were used etc. are discussed briefly below.

(a) Design :

Out of many possibilities the 4 X 4 Latin Square Design used in the experiment was as follows :

Table :6.2: Latin Square Design followed in Experiment

	Group I	Group II	Group III	Group IV
Unit 1	St_1T_1	St_2T_1	St_3T_1	St_4T_1
Unit 2	St_2T_2	St_3T_2	St_4T_2	St_1T_2
Unit 3	St_3T_3	St_4T_3	St_1T_3	St_2T_3
Unit 4	St_4T_4	St_1T_4	St_2T_4	St_3T_4

* St_1 , St_2 , St_3 , St_4 , are the four teaching strategies

* T_1 , T_2 , T_3 , T_4 are teachers

Each cell represents an experimental situation involving a Unit being taught by a particulaf teacher using a particular teaching strategy i.e. treatment variable. Each such combination

was taught for ten successive days as each unit comprised of ten lessons. After teaching the unit completely, the corresponding tests were administered. Each group was exposed to all Units, all the strategies and all the teachers, and time was kept constant.

(b) Sample :

The pupils, the teachers and the units of teaching involved for the requirements of the experiment were as follows :

(i) Pupils : The investigator has selected the school namely New Education School, Petlad for the purpose of experiment as the institution was able to fulfil all the facilities required. All pupils, both boys and girls of the seventh class of the school were involved in the experiment.

(ii) Teachers : The experimenter has involved such four teachers from his B.Ed. class, who had good knowledge of the content to teach, who could be programmed and who could decide and change strategies of teaching as required by the design, without any previous bias. They were thoroughly oriented with strategies of teaching, units, the lesson plans based thereon and with objectives of the study. The teachers embarked on the actual experimentation only after the sufficient practice under experts' supervision.

(iii) Units : The units of teaching were selected from the science text book, prescribed by the Gujarat Government, for the seventh class pupils of the state.

(c) Tools :

Tools in the study were used for two purposes.

The first purpose was to describe the nature of the sample, and for this I.Q. Test, Creative Thinking Test (T.T.C.T.: Figural version) and Pre-achievement Test were administered.

The second purpose was to measure the development of creative thinking and the achievement of the pupils, as a result of treatment variables. This purpose was served by administering corresponding tests of creative thinking and achievement, prepared by investigator.

6.8 Analysis of the Data

All the data collected through the above experiment were analysed by applying the various statistical techniques like means, SD's, correlations and analysis of variance (ANOVA), according to the demand of objectives and suitability of the data. In order to pin-point the significance of difference between mean scores, least significance difference test (L.S.D. Test i.e. extension of 't' test) was applied. The entire analysis was done by the investigator himself with the aid of pocket calculator, and attempt was made to project an integrated picture, out of the analysis of the data.

6.9 Findings

Results of the experiment were discussed in the light of hypotheses evolved and the major findings are as follows :

1. The difference existed between the selected strategies for their effectiveness in developing creative thinking and achievement in science of seventh class pupils is significant at .01 level of significance.
2. It was also found that the four strategies of teaching had significantly differential effects on the development of originality and flexibility of seventh class pupils but the F ratio for the effects of strategies was found to be not significant in the case of fluency.
3. On further analysis, it was found that the St_4 produced significantly high mean scores for achievement of the pupils than all other strategies. Strategies St_3 and St_2 produced significantly higher mean scores than St_1 and there was no evidence of significant difference between St_3 and St_2 .
4. Strategy St_4 was more effective in developing creative thinking and its components as compared to all other strategies.
5. It is observedt that the effects of strategies were dependent upon the level of intelligence, sex and creativeness of the pupils.
6. St_3 i.e. dominency of Practical Work did not show any significan superiority over lecture with respect to low intelligence, low creativeness and girls.
7. The results highlighted the importance of having the maximum use of A.V. Aids in the classroom teaching for enhancement of creative thinking.