

## **EFFECTIVENESS OF EXPERIENTIAL LEARNING APPROACH IN ENHANCING MATHEMATICAL CREATIVITY AMONG SECONDARY SCHOOL STUDENTS**

Dr. Manjula K Swamy<sup>1</sup>

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### **Abstract**

*The present paper is an attempt to study the Effectiveness of Experiential learning approach in enhancing Mathematical Creativity among the students at the secondary school level. The main objective of this study was to find out the effect of Experiential learning approach in enhancing mathematical Creativity of the students of the experimental group with the control group. The research design was true experimental pre-test, post-test design. Here the investigator had tried out on the sample of 80 students of class IX by teaching them using experiential learning approach and conventional method of teaching. The findings of the study reveal that the students of experimental group, which was taught by experiential learning approach significantly, shown better performance than those students who belonged to the control group. Consequently, experiential learning approach proved to be an effective intervention to help the students become active learners and also to enhance their mathematical creativity.*

**Keywords:** *Experiential learning approach, Mathematical Creativity.*

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### **INTRODUCTION**

Education is an unique investment for the present and the future. Education is very much necessary and plays a dynamic role for the growth and advancement of a country. The chief aim of education is to bring the qualitative change among the individuals to meet the demands and the challenges of the society.

When the teacher uses Experiential learning approach , students are enabled to analyse the consequences of a phenomenon, to classify the given data on various different bases, to seek alternate solutions, to associate the experiences with the present content, to relate the present content to day to day situations and apply the same in their life.

While concentrating on the consequences of current teaching-learning processes, Rote memorization develops brilliant engineers who are world class in reverse engineering. However, the country's need is not just people who 'do' but those who 'dream', who imagine

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<sup>1</sup> Assistant Professor, RV teachers College, 2nd Block, Jayanagar, Bangalore-11

new industries and open up new possibilities”. Education system should develop thinking skills and the ability to transform the knowledge into desirable output. The present system of education should focus on enhancing and fostering creativity among children by teaching them through various innovative strategies, methods, techniques and models of teaching. One such approach is Experiential learning, through which children gain knowledge through the concrete experiences that they gain through the activities.

The National policy of Education 1986 emphasis that “Mathematics should be visualized as the vehicle to train a child, tool to think, reason analyze and articulate logically apart from a being specific subject. It should be treated as concomitant to any subject involving analysis and reasoning”.

“Accuracy, exactness, precision compose the beauty of mathematics”. The student learns to be accurate and appreciate and also to adopt it as principle of life. He learns to influence and command others by his accuracy.

Mathematics is the base of all essential knowledge and progress in science and technology. In the words of Bacon “Mathematics is the gate and key of all sciences, today man can enjoy only because of the inventions that has been possible because of Mathematics. The applicability of mathematics is profoundly seen in various arenas. So it is aptly remarked, "Mathematics is a Science of all Sciences and art of all arts."

In 21<sup>st</sup> century, due significance is given to the development of thinking skills. In addition to these characteristics, one more characteristic feature of today’s world is ‘Rapid change’. With the traditional thinking methods is not possible to cope up with ‘change’.

In the words of Edward De Bono (1944, PP-206-207) “We find dealing with change particularly difficult because traditional western thinking was never designed for ‘change’. It was designed for a stable society, in which there could be no such concept of rapid change of over last one hundred years or so.” He concludes that ‘Traditional thinking’ is based on analysis, decision making and logic. There has to be another type of thinking process which will be based on possibilities, which will help an individual to think not about ‘What is’ but ‘What can be?’ and the alternate thinking is ‘creative thinking’.

## **NEED AND SIGNIFICANCE OF THE STUDY**

The universal objective of high school education is to promote thinking. The subjects prevalent in the school teaching must include curriculum that initiates the thinking process in

the minds of the students. The main aim of teaching science in schools has been to stimulate the exclusive talents of scientific learning through focus on theorizing, modifying the surroundings, and the process of rational thinking using the information available (Padilla, 1990).

The process of scientific thinking involves both thinking in a scientific and analytical thinking which encompass scientific methodology or what is commonly known in the present day as “science process skills”. Many activities are conducted to develop scientific abilities and skills among students. Scientific learning has been grouped into two types, basic, which gives knowledge on the simpler aspects of science, and integrated, one deals with the more complex knowledge which can be learn from the basics. The four principal methods of scientific learning are “observation, inference, calculation, classification, and projections which complete the process of scientific thinking and learning (Chiapetta, 1976).

According to the report of All Our Futures by the National Advisory Committee on Creative and Cultural Education, creativity is known as “democratic creativity” referring to the creativity of an ordinary individual. As per this, creativity is a universal phenomenon which is found in every student and has been summarized to mean “imaginative functioning of the mind designed to give a result of good credibility and originality” ((NACCCE, 1999, p. 29, para 26).

Experiential learning is a new way of learning in learning psychology, which helps students to learn the concept with in the classroom settings. In this Model, the students were provided with hands on experience which in turn facilitate retention of the concepts.

Tennyson and his associated also have concluded that “the students develop procedural knowledge, how to attain concepts with practice and also that the more procedural knowledge the students possess, the more effectively they attain and can apply knowledge”.

## **REVIEW OF LITERATURE**

Yaghoob Nami, Hossein Marsooli, Maral Ashouri (2014) conducted the study on relationship between students’ creativity and academic achievement. The researcher found that there is a positive relationship between creativity and achievement.

Granberg (2015) conducted his study on Geo Gebra, software which was used to collaborate and creative reasoning to solve mathematics problems. Results were highly appreciable in exhibiting high performance.

## **STATEMENT OF THE RESEARCH PROBLEM**

The problem selected for the research study was “Effectiveness of experiential learning in enhancing Mathematical Creativity among Secondary School Students.”

## **OBJECTIVES OF THE STUDY**

1. To develop the lessons based on Experiential learning approach in mathematics for standard IX students.
2. To compare mean scores of control group and experimental group in their pre-test with respect to Mathematical creativity of standard IX students.
3. To compare mean scores of control group and experimental group in their post-test with respect to Mathematical creativity of standard IX students.

## **HYPOTHESES OF THE STUDY**

1. There is no significant difference in the pre-test scores of mathematical creativity of control and experimental groups of standard IX students.
2. There is no significant difference in the post test scores of control and experimental group with respect to Mathematical creativity of standard IX students.

## **METHODOLOGY**

### **Design of the Study:**

The researcher has followed the quasi-experimental design for testing the Effect of Experiential leaning approach in enhancing Mathematical Creativity among Secondary School Students.

The researcher taught the experimental group using lessons transcripts based on Experiential learning and used conventional method of teaching for the controlled group. The pretest and posttest group design was used in the present study.

### **Variables of the Study:**

#### 1. Independent Variables:

- Conventional method of teaching
- Treatment using experiential learning approach (Kolbe’s Method)

#### 2. Dependent Variable: Mathematical creativity

#### 3. Moderator Variables: Gender

### Population and Sample:

The entire students studying in IX standard of Bangalore City forms the population of the study, the students studying in IX std., of NHPS, Indiranagar are the sample of the study.

### Statistical Techniques used for Analysis of Data

The statistical techniques used to analyze the collected data with a view to test the hypotheses were Mean, standard deviation and 't' test.

### OPERATIONAL DEFINITION OF KEY-TERMS

**Effectiveness:** It indicates the degree of change in the level of creativity in mathematics of students of standard IX.

**Conventional method teaching:** This method of teaching is traditional way teaching in which chalk and talk method is literally used by many teachers as it is teacher centered and subject oriented. The emphasis here is mainly in remembering and reproducing of concept facts, principles, formulas and theories. The students are passive listeners and do not participate actively in the teaching-learning process.

**Mathematical creativity:** Creativity is the capacity or ability of an individual to create, discover or produce a new idea or object including the re-arrangement or re-shaping of what is already known to him. It is represented by the scores taken by the students on administering Mathematical creativity test to standard IX students.

**Gender:** comprises boys and girls studying in standard IX

### ANALYSIS AND INTERPRETATION OF DATA

**Hypothesis-1:** *There is no significant difference in the pre-test scores of Mathematical creativity of control and experimental groups of standard IX students.*

Table 1. Source, group, number, mean, standard deviation and 't' value of control and experimental groups with respect to pre-test scores of Mathematical creativity of standard IX students

| Source                  | Group        | N  | Mean  | S.D  | 't' Value | Level of significance |
|-------------------------|--------------|----|-------|------|-----------|-----------------------|
| Mathematical creativity | Control      | 40 | 11.9  | 2.92 | 0.086     | NS*                   |
|                         | Experimental | 40 | 11.85 | 2.23 |           |                       |

From the table 1, it can be seen that, obtained ‘t’ value is 0.086 is less than the table value and is not significant. It indicates that the mean scores of mathematical creativity do not differ significantly. Thus, the null hypothesis ‘there is no significant difference between control and experimental groups with respect to pre-test scores of mathematical creativity, is accepted. Hence it may be concluded that, experimental and control group were alike and equal with reference to their mathematical creativity before subjected to treatment.

***Hypothesis-2: There is no significant difference in the post test scores of control and experimental group with respect to Mathematical creativity of standard IX students***

Table 2. Source, group, number, mean, standard deviation and ‘t’ value of control and experimental groups with respect to post-test scores of Mathematical creativity of standard IX students

| Source                  | Group        | N  | Mean  | S.D   | ‘t’ Value | Level of significance |
|-------------------------|--------------|----|-------|-------|-----------|-----------------------|
| Mathematical creativity | Control      | 40 | 11.65 | 2.44  | 9.037*    | 0.01                  |
|                         | Experimental | 40 | 17.75 | 3.505 |           |                       |

**Significant at 0.01 level**

From the table 2, it can be seen that, obtained’ value is 9.037 is greater than the table value and is significant at 0.01 level. It indicates that the mean gain scores of mathematical creativity differ significantly. Thus, the null hypothesis ‘there is no significant difference between control and experimental groups with respect to post-test mean gain scores of mathematical creativity is rejected and the alternative hypothesis is accepted. Thus, it means ‘there is significant difference between control and experimental groups with respect to post-test mean gain scores of mathematical creativity. Hence it may be concluded that, the Experiential learning approach might have helped in understanding of the concepts and knowing the essential and non-essential attributes and apply the same in solving the problems in mathematics. The students have better clarity in attaining the concept.

**FINDINGS OF THE STUDY**

- There is no significant difference between control and experimental groups with respect to pre-test scores of Mathematical Creativity.

- There is significant difference between control and experimental groups with respect to post-test mean gain scores of Mathematical Creativity.

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