



Effectiveness of Gaming Strategy on Mathematical Creativity of Students At Secondary Level

KEYWORDS

Effectiveness, Gaming Strategy, Mathematical Creativity

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ABSTRACT

The present study was intended to find the effectiveness of Gaming Strategy on Mathematical Creativity of Students at Secondary level. The research works showed that it was possible to promote mathematical creativity in children by means of mathematical teaching by providing suitable teaching experiences. Thus, through the study, the investigators try to find the effectiveness of gaming strategy on mathematical creativity of secondary school students. Chaudhari (1991) explains gaming strategy is an instructional strategy that uses the stimulated situation called games in teaching learning process. Through this strategy, the student is typically required to think critically, take risks, make decisions and attain specific objectives in managing the situations or task. The investigators adopted Experimental method in the present study on a sample of 130 secondary school students. The study revealed that the gaming strategy is effective over Activity Oriented Method for developing Mathematical Creativity of students at secondary level.

INTRODUCTION

Mathematics is a core subject in our education system. In 1960's Mathematics education developed qualitatively by including the teaching of modern Mathematics in school children. This development become necessary to prepare today's children to face the challenges of future age. It helps children to make sense of their world outside school and helps them to construct a solid foundation for all members of our society. The nation needs to prepare the 'young' people in higher proficiency level. Courant and Robbins (1996) defined "Mathematics is an expression of human mind reflects the active will, the contemplative reason and the desire for aesthetic perfections. Its basic elements are logic and institution analysis and instruction, generality and individuality." Teaching is a human activity performed by complex human organism in a complex situation. It is to be dynamic and so lively responses are needed in the classroom. Any teaching-learning process becomes effective only if all the sense is involved in its quality. Affinity to games being a natural instinct, the most effective means for involving the learner is the process of learning through games. There are several educationally useful ways of incorporating games into mathematics lessons. It can be used as topic starter that introduce a concept, some games can be used to explore mathematical ideas and therefore a main component of a lesson.

NEED AND SIGNIFICANCE OF THE STUDY

Webster's dictionary (1991) defined "Mathematics is a science of numbers and their operation, interrelations, combinations, generations and abstractions and of space configuration and their structure, measurement, transformations and generalizations". Thus Mathematics has the qualities of both art and science. As an art, Mathematics has ample opportunities are there to create mathematical patterns, structures and designs. As a science, Mathematics performs the functions of science. Since Mathematics has the qualities of both art and science, it is an apt subject for developing creative thinking. Edward (1997) defines Mathematical creativity as the "ability to give numerous, different and applicable responses when presented with a mathematical situation in written, graphic or hart form". Research works showed that it was possible to promote mathematical creativity in children by providing suitable

teaching experiences. Thus the investigators try to find the effectiveness of gaming strategy on mathematical creativity of students at secondary level. The investigator selects secondary school students for the study because the children at secondary level have vast inner resources of physical and mental energy. Their energy should be directed to organize, analyze and interpret their activity and thinking ability.

Games are the successful sources of practical, mathematical activities, which will stimulate child's interest and promote positive attitude towards Mathematics. Integrating Mathematics to games, the child can understand all aspects of mathematical knowledge. So Chaudhari (1991) explains gaming strategy is an instructional strategy that uses the stimulated situation called games in teaching-learning process. Though this strategy, the student is typically required to think critically, take risks, make decision and attain specific objectives in managing the situations or task. Hence the present study intended to find the effectiveness of Gaming Strategy on Mathematical Creativity of Students at Secondary level.

METHODOLOGY IN BRIEF

The investigators adopted experimental method for the study and non-equivalent pre test post test design was used. The sample was divided into two groups- experimental and control groups. Both the groups were administered the test of Mathematical Creativity as pre-test. The experimental group was taught with Gaming Strategy and the control group was treated with Activity Oriented Method. After experimentation, the same mathematical creativity test was administered as post test to both the groups to obtain their mathematical creativity.

The sample constituted 130 students of class X of two schools at Ernakulam District in which 70 were included in experimental group and 60 were included in control group.

The tools used in the study were

- Lesson transcript based on Gaming Strategy
- Lesson transcript based on Activity Oriented Method
- Test of Mathematical Creativity (Dr. Sumangala,1993)

The statistical techniques used for analyzing the collected data were the test of significance of difference between two means and Analysis of Covariance (ANCOVA)

ANALYSIS AND DISCUSSION

The analyzed data are given under the following headings.

- To find the effectiveness of Gaming Strategy on Mathematical Creativity of students at secondary level

Before experiment, the test of mathematical creativity was administered as pre-test and the data was collected and analyzed using the test of significance of difference in mean scores. The data and result of test of significance of difference between the means of pre-test scores of experimental and control groups was given below.

Table 1. Test of significance of difference between the means of pre-test scores of experimental and control groups

Group	N	Mean	SD	t	LS
Experimental	70	23.114	12.032	0.29	P > .05
Control	60	22.562	9.470		

From the table 1, it is clear that the obtained t value ($t = 0.29, p > .05$) is not significant at .05 level of significance. It implied that there exists no significant difference in the means of pre-test scores of Mathematical Creativity of experimental and control groups. It inferred that the two groups did not differ significantly in Mathematical Creativity before the experiment.

After the treatment, both the groups were subjected to the same test as post test. The data are analyzed using the test of significance of mean scores of post test. The table 2 provides the result of test of significance of the difference between the means of post test scores of Mathematical Creativity of students from experimental and control groups.

Table 2. Test of significance of difference between the means of post-test scores of experimental and control groups

Group	N	Mean	SD	t	LS
Experimental	70	30.14	13.03	3.27	P < .01
Control	60	23.86	9.02		

The obtained t value ($t = 3.27, p < .01$) is significant at .01 level of significance on the mean scores of post test scores of Mathematical Creativity of students at secondary level. It implies that there exists significant difference in the mean scores of post test scores of Mathematical Creativity of students at Secondary level. From table 2, it was also clear that the mean score of post test scores of Mathematical Creativity of students from experimental group ($M = 30.14$) is significantly higher than that of students from control group ($M = 23.86$). it implied that the Gaming Strategy is effective for developing Mathematical Creativity of students at secondary level.

Genuineness of the Difference

The analysis of the post test scores in two groups showed that there is significant difference in the scores of Mathematical Creativity. But the two groups selected for the study were non-equivalent. Hence it cannot be concluded that the students of the two groups are differed significantly in the post test scores by simply comparing it. Also, the

higher post test scores of the students in the experimental group than that of control group can not be attributed to the application of Gaming Strategy to the experimental group. In this context, it became necessary to analyze the data using Analysis of Covariance, by which the difference in the initial status of the two groups can be removed statistically.

Table 3. Summary of ANCOVA of X (pre test) and Y (post test) of experimental and control groups

Sources of Variation	df	SSx	SSy	MSx (Vx)	MSy (Vy)
Among Means	1	29.3	711.5	29.3	711.51
Within groups	128	13466.82	14401.4	105.21	112.51
Total	129	13496.12	15112.9		

$F_x = 0.28 \qquad F_y = 6.32$

From table of F-ratio, for df 1/128

F at 0.05 level = 3.96 \qquad F at 0.01 level = 6.84

The obtained F_x is not significant at .05 level of significance ($F_x = 0.28, df = (1,128), p > .05$). it implies that the experimental and control groups do not differ significantly in the pre-test scores of Mathematical Creativity. The obtained F_y value ($F_y = 6.32, df = (1,128), p < .05$) is significant at .05 level of significance. It indicates that the two groups differ significantly in the post-test scores of Mathematical Creativity.

The total sum of squares and adjusted mean square variances for post test scores of Mathematical Creativity were computed and F-ratio was calculated. The result was given in table 4.

Table 4. Summary of ANCOVA of Mathematical Creativity of experimental and control groups

Source of Variation	df	SSx	SSy	SSxy	SSyx	MSyx
Among means	1	29.3	711.5	-144.40	903.79	903.79
Within groups	127	13466.82	14401.4	8512.06	9021.15	
Total	128	13496.12	15112.9	8367.66	9924.94	71.03

$SD_{yx} = 8.43 \qquad F_{yx} = 12.72$

From table of F-ratio, for df 1/127

F at 0.05 level = 3.96 \qquad F at 0.01 level = 6.84

From table 4, it is clear that the obtained F-ratio ($F_{yx} = 12.72, df = (1,127), p < .01$) for the adjusted means of post test scores is differ significantly. Hence it can be concluded that the mean scores of post test scores of Mathematical Creativity of experimental and control groups differ significantly after they are adjusted for difference in the pre-test scores.

The investigator analyzed the adjusted means of post test scores of Mathematical Creativity of experimental and control group. Table 5 gives the result of the comparison of adjusted means of post test scores of Mathematical Creativity of experimental and control groups.

Table 5. Result of the comparison of adjusted mean for the post-test scores of students from experimental and control groups

Group	N	Mx	My	Mxy
Experimental	70	23.11	30.1	30.14
Control	60	24.07	25.5	25.15
General	130	23.59	27.80	

$$SE_D = 1.48$$

$$t = 3.57$$

The calculated t value ($t = 3.57, p < .01$) is significant at .01 level of significance. Hence it can be concluded that the experimental and control groups differ significantly in their means of adjusted post test scores of Mathematical Creativity. Also from table 5, it is clear that the mean of experimental group ($M = 30.14$) is comparatively higher than the means of control group ($M = 25.15$) in Mathematical Creativity. So it becomes apparent that the Gaming Strategy is more effective than the Activity Oriented Method on developing Mathematical Creativity of students at secondary level.

FINDINGS AND CONCLUSION

The investigators analyzed the effectiveness of Gaming Strategy on Mathematical Creativity of students at Secondary level. The study revealed that the Gaming Strategy is more effective than Activity Oriented Method for developing Mathematical Creativity of students at secondary level. It was also found that the Gaming Strategy is more effective than Activity Oriented Method on enhancing the Mathematical Creativity of boys as well as girls at second-

ary level. In general it was concluded that the Gaming Strategy is effective over Activity Oriented Method on enhancing Mathematical Creativity of students at secondary level.

Hence it is necessary to incorporate Gaming Strategy in Mathematics Classrooms for enhancing the Mathematical Creativity. Games are the successful sources of practical mathematical activities, which will stimulate child's interest and promote positive attitude towards mathematics. So the teachers can sustain the interest of students through out the class by incorporating games in their teaching. This strategy of teaching gives teachers enough freedom to choose activities and materials of varying forms and this helps in planning classroom activities according to the needs and interest of pupils. Pre-service and in-service teacher training programmes should focus on inculcating games on teaching mathematics in order to make our schools better in the future.

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