

THE RELATIONSHIP BETWEEN CHARACTERISTICS OF CREATIVE THINKING IN MATHEMATICS AND WRITING TO LEARN MATHEMATICS AMONG IX STANDARD STUDENTS

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ABSTRACT

Mathematics is in all walks of life from the worlds of business and technology, to the sciences, to medicine, and even to environmental and management. Very few research studies have been conducted in mathematical creativity and writing to learn mathematics students who are conventional in thought and readily conform to the school norms are considered better for academic tasks and they are creative students who were seen as threats and became challenging for teachers. In this study the investigator has attempted to study the influences of various demographic variables like gender, locality and medium of instruction. The researcher adopted normative survey method. 500 students of IX standard from 8 schools in Salem District were selected as sample by stratified random sampling technique. Characteristics of creative thinking in mathematics scale constructed by Renzulhi, J.S et.al (2004). This contained 40 items. Its reliability value was 0.80. Writing to learn mathematics scale constructed by Edel Mary Reilly (2007). This contained 20 items on 3 dimensions. A reliability co-efficient of 0.84 was obtained using split half method. Quantitative data analysis was done. Results shows that IX Standard Boys and Girls do not differ in mathematical characteristics, creative characteristics and characteristics of the potentially creative thinking in mathematics and IX Standard rural and urban students do not differ in their Mathematics in general, writing in math class, Math teacher.

Keywords: Characteristics Creative Thinking, Writing to Learn, Mathematics, IX Standard Students

Introduction

Mathematics plays a vital role our daily life. In this science and technology era mathematics dominates almost every field of one's activities. Mathematics has become every man's every day concern as it has permeated through the human life in such a way. Mathematical knowledge and wisdom is not the monopoly of any particular nation or a country, as it travels beyond its places of birth, discovery or invention, benefitting people all over the globe, and in the space also. It has become an instrument of creating international understanding and bringing people nearer.

The author discussed in this paper is focused on creative thinking in mathematics. It is interested to explain about creative thinking in mathematics because many students are still difficulties in solving mathematical problems in a variety of way. Through an explanation of creative thinking in this paper, readers are expected can find out the definition of creative thinking and the essence of creative thinking. One of the factors that influence of student learning outcomes is the characteristics of students thinking. The characteristics of these students can be viewed as behavioral inputs. Characteristics of creative thinking in mathematics exhibit different thinking styles. It will help in writing to learn mathematics which enhances learning skills and writing skills that would improve their knowledge, ability, problem solving capacity. In learning mathematics the characteristics of creative thinking very important for students. It helped deliver their minds when solving a problem.

Learning mathematics is complex. To develop new and/or improved conceptual frameworks, students must be given opportunity to process their ideas before, during, and after learning takes place and that may be done orally, mentally, or in writing. Reflection and communication are intertwined processes in mathematics learning. NCTM (2000), "Writing in mathematics can also help students consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about the ideas". Writing-to-learn develops critical thinking, analysis, application and other higher level thinking skills. Writing includes short or informal writing tasks designed by the teacher throughout the lesson to help students think through key concepts and ideas.

Mathematics teachers will find that they may have to explicitly teach and provide scaffolding for each of these strategies before their students will be able to implement writing in mathematics. Students have to monitor and reflect on the strategies and processes they selected when they are writing about problem solving. In India the quality improvement of mathematics education is the greater need of today the quality of education can be measured through achievement and psychomotor domains. To achieve this goal, positive mathematics characteristics and writing to learn should be highly motivated to develop their skills like mathematics aptitude, logical thinking, reasoning etc.

Need and Significance of the study

In the past very few research studies have been conducted in mathematical creativity and writing to learn mathematics students who are conventional in thought and readily conform to the school norms are considered better for academic tasks and they are creative students who were seen as threats and became challenging for teachers. Recent research in the field of creativity changed the outlook of the teacher educators regarding creative students and made them to know the relationship between mathematical creativity and writing to learn mathematics.

The lack of literature on the subject of mathematical creativity and writing to learn mathematics was one of the motivation for conduction this study. So the study on writing to learn mathematics in relation with mathematical creativity will be helpful to bring clearly their influence based on various variables among IX standard students.

Scope of the Study

This study is confined to **“The relationship between the Characteristics of creative thinking in mathematics and Writing to learn mathematics of IX standard students”**. This study will help the teachers and administrators to get a vivid idea about how the creative thinking and writing to learn mathematics influences the learning of mathematics. This study also emphasizes the need and importance of writing to learn mathematics for the student. In this study the investigator attempts to study the influences of various demographic variables like gender, locality and medium of instruction on characteristics of creative thinking in mathematics and writing to learn mathematics.

Title of the problem

The problem of the present study is selected and entitled as **“The relationship between Characteristics of Creative thinking in Mathematics and Writing to Learn Mathematics among IX standard students”**.

Objectives of the study

1. To study the significant difference in the characteristics of creative thinking in mathematics of IX standard students based on the select subsamples gender, locality, and medium of instruction.
2. To find the significant difference in the writing to learn mathematics of IX standard students based on the select subsamples gender, locality and medium of instruction.
3. To investigate the significant relation between the characteristics of creative thinking in mathematics and writing to learn mathematics of IX standard students.

Hypotheses of the study

1. There is no significant difference in the characteristics of creative thinking in mathematics of IX standard students based on the select subsamples gender, locality, and medium of instruction.
2. There is no significant difference in the writing to learn mathematics of IX standard students based on the select subsamples gender, locality and medium of instruction
3. There is no significant relation between the characteristics of creative thinking in mathematics and writing to learn mathematics of IX standard students.

Methodology

Participants

The population of the study consisted of all IX standard students in Salem District. 500 students in the IX standard from 8 schools were taken. They were selected by stratified random sampling from various Government, Government Aided, and Private schools. Table 1 shows the sample distribution.

Table 1
Sample Distribution

	Variables	Samples	Percentage (%)
Gender	Boys	282	56.4
	Girls	218	43.6
Locality	Rural	229	45.8
	Urban	271	54.2
Medium of Instruction	English	172	34.4
	Tamil	328	65.6
Entire	Samples	500	100.0

The above-mentioned table shows the frequency distribution and the percentages of the all the demographic tables that were considered in the present study. Among the 500 students; 282 were boys and 218 were girls in gender. In this there are rural students (n= 229) and urban students (n= 271). Among seven schools, 172 students are studying in English medium and 328 students are studying in Tamil medium.

Assessments and Instruments

The following instruments had been used in the research to collect the data. Two questionnaires were used to collect the data of characteristics of creative thinking in mathematics and writing to learn mathematics from the participants. The first was to find out the characteristics of creative thinking in mathematics. It constructed by Renzulhi, J.S et.al (2004)the scale includes 40 items with a five – point scale ranging from 1(strongly disagree) to 5 (strongly agree) with the higher scores indicating a higher frequency of occurrence of creativity described for each item. The scale captures the three dimensions of characteristics of creative thinking in mathematics, namely Mathematical Characteristics (MC), Creativity Characteristics (CC) and Characteristics of the Potentially Creative thinking in Mathematics (CPCM). The participants were allotted 25 minutes to complete the questionnaire. Regarding the internal consistency of the scale, Cronbach’s alpha coefficients for all the subscales were above 0.70 in the current study, with MC ($\alpha= 0.78$), CC ($\alpha= 0.74$) and ($\alpha= 0.83$). Maximum possible score is 100 and Minimum score is 20 of characteristics of creative thinking in mathematics.

The second questionnaire was writing to learn mathematics scale, developed and constructed by Edel Mary Reilly (2007) in the context of India. The scale includes 20 items

with a five – point scale ranging from 1(strongly disagree) to 5 (strongly agree). It has three subscales: (a)

Mathematics in General (MG, $\alpha= 0.83$), (b) Writing in Math Class (WMC, $\alpha= 0.80$) and Math Teacher (MT, $\alpha= 0.85$). Students were asked to show their responses by planning tick mark (✓) appropriate column. Maximum possible score is 100 and Minimum score is 20.

The participants were allotted 15 minutes to complete the questionnaire. Meanwhile, the participants had to provide their demographic information, such as gender, locality and medium of instruction of the two questionnaires employed in the study.

Procedure

The investigator went to the schools and got prior permission from the heads of the schools. The investigator gave instruction to the students about the rating scale and explained in Tamil about the scale to collect data. Sufficient time was given to fill the data. It took about two weeks to have all the copies collected. The data were analyzed for descriptive and inferential statistics using SPSS.

Results

Quantitative Phase

Table – 2

Characteristics of creative thinking in Mathematics

Groups						
Dimensions	Boys (282)		Girls (218)		t	NS/S
	M	SD	M	SD	Value	
MC	22.41	3.67	21.93	3.20	1.56	NS
CC	20.44	3.74	20.96	3.28	1.65	NS
CPCM	47.43	6.41	47.50	6.09	0.32	NS
Rural (229)			Urban(271)			
MC	22.24	3.24	22.19	3.66	0.16	NS
CC	20.72	3.21	20.59	3.82	0.41	NS
CPCM	47.50	6.14	47.51	6.38	0.02	NS
English (172)			Tamil (328)			
MC	21.69	3.25	22.49	3.56	2.53*	S(0.05 level)
CC	20.83	3.46	20.55	3.60	0.85	NS
CPCM	47.12	6.53	47.71	6.12	0.98	NS

** Significant at 0.05 Level

S- Significant

MC - Mathematical Characteristics, CC - Creativity Characteristics

CPCM - Characteristics of the Potentially Creative thinking in Mathematics

From the above table it is noticed that the calculated‘t’ values are less than the table value at 0.05 level in eight cases. Hence the hypothesis is accepted. But the calculated‘t’

value is greater than the table value at 0.05 level in remaining one case. Hence the hypothesis is not accepted.

Table - 3
Writing to learn mathematics

Groups						
Dimensions	Boys (282)		Girls (218)		t	NS/S
	M	SD	M	SD	Value	
MG	18.54	3.09	18.48	2.75	0.23	NS
WMC	14.20	2.34	14.71	2.10	1.41	NS
MT	14.36	2.27	14.94	2.10	0.61	NS
	Rural (229)		Urban(271)			
MG	18.65	2.88	18.44	2.98	0.80	NS
WMC	14.46	2.21	14.39	2.27	0.40	NS
MT	14.84	2.21	14.44	2.19	0.36	NS
	English(172)		Tamil (328)			
MG	18.37	2.729	18.62	3.034	0.94	NS
WMC	14.69	2.241	14.29	2.239	1.98**	S(0.05 level)
MT	14.60	2.270	14.63	2.177	0.02	NS

** Significant at 0.05 Level

S- Significant

MG – Math in General

WMC – Writing in Math Class

MT – Math Teacher

From the above table it is demonstrated that the calculated ‘t’ values are less than the table value at 0.05 level in eight cases. Hence the hypothesis is accepted. But the calculated ‘t’ values are greater than the table value at 0.05 level in remaining one case. Hence the hypothesis is not accepted.

Correlation Analysis

There is no significant relationship between characteristics of creative thinking in mathematics and writing to learn mathematics

Table – 4

Table showing the Characteristics of creative thinking in mathematics and writing to learn in mathematics of IX standard students

Characteristics of Creative Thinking in Mathematics	Writing to Learn Mathematics
Pearson correlation	0.160** (Significant at 0.05Level)

** Table value of r for df 500 at 0.01 level is 0.115. In this case have a significant difference to be observed. Hence the hypothesis is not accepted.

Major Findings

Characteristics of creative thinking in mathematics

- In mathematical characteristics mean value is moderate than the maximum marks of mathematical characteristics.
- In creative characteristics mean value is lower than the maximum marks of creative characteristics.
- In Characteristics of the potentially creative thinking in Mathematics mean value is lower than the maximum marks of Characteristics of the potentially creative thinking in Mathematics.

Writing to learn mathematics

- In Math in general mean value is moderate than the maximum marks of Math in general.
- In Writing in math class mean value is moderate than the maximum marks of Writing in math class.
- In Math teacher mean value is moderate than the maximum marks of Math teacher

Findings from Analysis of Data

Gender Based Results

- IX Standard Boys and Girls do not differ in mathematical characteristics, creative characteristics and characteristics of the potentially creative thinking in mathematics. IX standard boys have higher mean value (22.41) than the girls mean value (21.93) of IX standard students in the dimension mathematical characteristics. IX standard girls have higher mean value (20.96) than the boys mean value (20.44) of IX standard students in the dimension creative characteristics. IX standard girls have higher mean value (47.50) than the boys mean value (47.43) of IX standard students in the dimension characteristics of the potentially creative thinking in mathematics.
- IX Standard students Boys and Girls do not differ in their math in general, writing math in class and math teacher. IX standard Boys have higher mean value (18.54) than the Girls mean value (18.48) of IX standard students in the dimension math in general. IX standard girls have higher mean value (14.68) than the boys mean value (14.20) of IX standard students in the dimension writing in math class. IX standard girls have higher mean value (14.94) than the boys mean value (14.36) of IX standard students in the dimension math teacher.

Locality Based Results

- IX Standard Rural and Urban students do not differ in mathematical characteristics, creative characteristics and characteristics of the potentially creative thinking in mathematics. IX standard rural students have higher mean value (22.24) than the urban mean value (22.19) of IX standard students in the dimension mathematical characteristics. IX standard rural students have higher mean value (20.72) than the urban mean value (20.59) of IX standard students in the dimension creative

characteristics. IX standard rural students have higher mean value (47.52) than the urban mean value (47.51) of IX standard students in the dimension characteristics of the potentially creative thinking in mathematics.

- IX Standard Rural and Urban students do not differ in their Mathematics in general, writing in math class, Math teacher. IX standard rural students have higher mean value (18.65) than the urban mean value (18.44) of IX standard students in the dimension math in general. IX standard rural students have higher mean value (14.46) than the urban mean value (14.39) of IX standard students in the dimension writing in math class. IX standard rural students have higher mean value (47.52) than the urban mean value (47.51) of IX standard students.
- IX Standard Rural and Urban students do not differ in their math in general, writing in math class, Math teacher. IX standard rural students have higher mean value (18.65) than the urban mean value (18.44) of IX standard students in the dimension math in general. IX standard rural students have higher mean value (14.46) than the urban mean value (14.39) of IX standard students in the dimension math in general. IX standard rural students have higher mean value (14.84) than the urban mean value (14.44) of IX standard students in the dimension math teacher.

Medium of Instruction

- IX Standard English and Tamil medium students differ in mathematical characteristics mean while IX Standard English and Tamil medium students do not differ creative characteristics and characteristics of the potentially creative thinking in mathematics. IX standard Tamil medium students have higher mean value (22.49) than the English medium students mean value (21.69) of IX standard in the dimension mathematical characteristics. IX standard English medium students have higher mean value (20.83) than the Tamil medium students mean value (20.55) of IX standard in the dimension creative characteristics.
- IX Standard English and Tamil medium students do not differ in their mathematics in general, writing in math class, math teacher. IX standard Tamil medium students have higher mean value (18.62) than the English medium students mean value (18.37) of IX standard. IX standard English medium students have higher mean value (14.69) than the Tamil medium students mean value (14.29) of IX standard. IX standard Tamil medium students have higher mean value (14.63) than the English medium students mean value (14.60) of IX standard.

Correlation Analysis

There is significant positive correlation between Characteristics of creative thinking in mathematics of writing to learn in mathematics of IX standard students.

Educational Implications of the study

Mathematics education is crucial to the entire developmental process of the country. Mathematics is poorly tough and badly learnt, it is little more than burdening the mind with dead information, and it could degenerate even into a new superstition. Mathematics has

added a new dimension to education and to its role in the life of nation, but central to all this is the quality of education.

This finding should enlighten educational authorities to devise instructional strategies across the curriculum to enhance the Mathematics Characteristics and writing to learn of Science students. Also learning experiences provided in the class rooms should include such activities which provide opportunities for students to bring out analogies, to classify, to draw inferences, to arrive at generalizations and so on.

The findings of this study revealed that girls were better in writing in math class than boys, this suggest that boys also should be given more practice in school to write math in class to become efficient.

Conclusion

The problem of the present study is titled as “**The relationship between the Characteristics of creative thinking in mathematics and Writing to learn mathematics of IX standard students**”. The finding of this study indicates that the IX Standard Boys and Girls do not differ in mathematical characteristics, creative characteristics and characteristics of the potentially creative thinking in mathematics and IX Standard rural and urban students do not differ in their Mathematics in general, writing in math class, Math teacher.

References

- Ervynck, G. (1991). Mathematical creativity. In D. Tall. (Ed.), Advanced mathematical thinking (pp.42-53). Netherlands: Kluwer Academic Publishers.
- Heid, M. K. (1983). Characteristics and special needs of the gifted student in mathematics. *The Mathematics Teacher*, 76, 221–226.
- Marston, J. (2007). Promoting early mathematical patterning in kindergarten. *Reflections*, 32(1), 21-24.
- Messiner, H. (2000, July-August). Creativity in mathematics education. Paper presented at the meeting of the International Congress on Mathematical Education, Tokyo.
- National Council of Teachers of Mathematics. (2000). Professional standards for teaching mathematics. Reston, VA: The National Council of Teachers of Mathematics