

EFFECT OF CONCEPT MAPPING STRATEGY IN MATHEMATICS ON ACHIEVEMENT IN RELATION TO ANXIETY IN MATHEMATICS

*Dr Khushvinder Kumar

**Jaskaranjeet Singh

Abstract

The present study investigated the effect of concept mapping strategy in mathematics on achievement in relation to anxiety in mathematics. The study was conducted on 60 students of IX grade in Government School of Punjab. Pre-test post-test quasi-experimental method and 2X2 ANCOVA design was employed. No significant effect of the concept mapping strategy in mathematics on achievement in relation to anxiety was found.

Keywords: Concept mapping, Mathematics Achievement and Anxiety in Mathematics.

Concept maps are basically the spatial representations of concept and their interrelationships- that are intended to present the knowledge structures that humans mind stores (Jonassen, Beissner & Yacci, 1993). A concept map is the method of presenting relationships between ideas and images. As a road map represents the locations of different places, and a circuit diagram of an electrical appliance represents its workings and eases the path, similar function is of concept map.

"Concept maps are graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts. We define concept as a perceived regularity in events or objects, or records of events or objects, designated by a label."

-Novak & Canas, 2008

Mathematics is essential not simply in the education of scientists', engineers and financial specialist but also in the education of each working citizen. If the working people are good in mathematics so the good result will be in field of science and technology. For the people to be good in mathematics, they should learn mathematics in their schools, which results to good mathematics achievement in their school levels. Regarding this need the national educational programs, and evaluation standards for school mathematics aims the need for all students to create mathematics proficiency. The NCTM's gave five point for all students are that the students:-

- Understand mathematics to value mathematics.
- To become self-confident in their ability to do mathematics.
- Become mathematics problem solvers and figure out how to communicate mathematically
- Understand mathematics to reason mathematically.

MATHEMATICS ACHIEVEMENT

Mathematics achievement refers to success or proficiency attained in mathematics subject which can be assessed with achievement test (Al-Agili, 2012).

ANXIETY IN MATHEMATICS

Anxiety in mathematics refers to learned phenomena on account that an individual has negative cognito-affective reactions (worry-fear/tension/physiological reactions etc.) towards mathematics (Sharma, Yogesh and Sansanwal, 2011)

METHOD

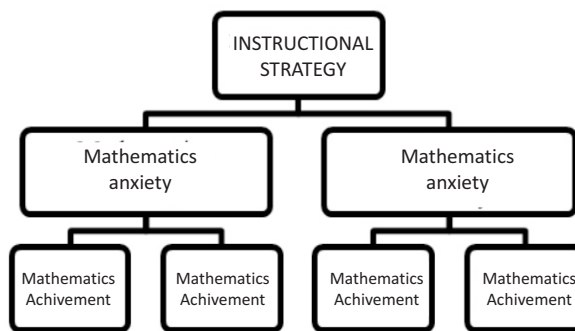
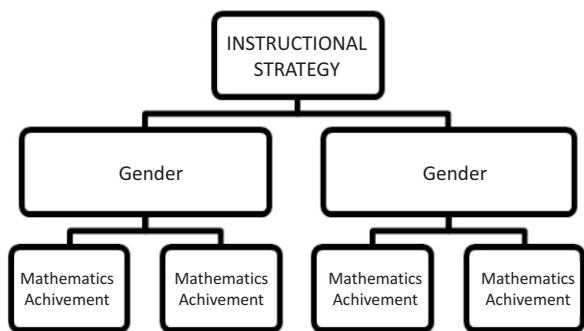
The present study was experimental in nature. The dependent variable was mathematics achievement. Concept mapping was the treatment variable. Mathematics anxiety was the independent classificatory variable.

DESIGN

As the study was experimental in nature and designed on the lines of non-equivalent control group quasi experimental design. The data was analyzed by 2x2 factorial designed ANCOVA. The pre-test scores were controlled to check the initial difference in the experimental and control groups taken as intact sections. The layout of two sets of ANCOVA is given below:-

*Principal, Multani Mal Modi College Patiala, Punjab

**Govt. Math Teacher, Govt. Senior Secondary School Khosa Pando



Objective

To compare the adjusted mean scores of Mathematics achievement of Experimental and Control Groups by considering Pre-Mathematics achievement as covariate.

To compare the adjusted mean scores of Mathematics achievement of Male and Female students by considering Pre-Mathematics achievement as covariate.

To study the Interaction effect of treatment and gender on Mathematics achievement of students by considering Pre-Mathematics Achievement as covariate.

To study the effect of mathematics Anxiety on Mathematics Achievement.

To study the Interaction effect of treatment and anxiety on Mathematics achievement of students by considering Pre-Mathematics Achievement as covariate.

Sample

Sample of the study comprised of students from three schools selected randomly from district Moga

of Punjab. The intact original groups of the school were assigned as control group and experimental group. Thus on the whole there were 31 students in experimental group and 29 students in control group. The sample was comprised of 60 students from grade IX for the conduct of the study.

Measures

- Modules based on concept mapping (developed by investigator) were administered on experimental group.
- Achievement test in mathematics (developed by investigator) was administered to study the achievement of students in mathematics.
- Mathematics anxiety scale (Sharma, Yogesh and Sansanwal; 2011) was administered to study the anxiety of the students in mathematics.

Analysis and Results

- The first objective was to compare the adjusted mean scores of Mathematics achievement of Experimental and Control Groups by considering Pre-Mathematics achievement as covariate.

Table 1 :Summary of ANCOVA of Mathematics achievement of Experimental and Control Groups by considering Pre- Mathematics Achievement as Covariate

Source of Variance	SSy.x	df	MSSy.x	F _{y,x}
Instructional Strategy through Concept Mapping	13.427	1	13.427	0.270
Error	2730.452	57	49.645	
Total		58		

From the Table 1, it can be seen that adjusted F-Value is 0.270 with df=1/57 which fails to reach 0.05 level of significance. It indicates that the adjusted mean scores of mathematics achievement of

Experimental and Control Groups do not differ significantly when Pre- Mathematics achievement was considered as covariate. In this context, the null hypothesis, namely, “There is no significant

difference in the adjusted means scores of Mathematics Achievement of Experimental and Control Groups by considering Pre- Mathematics Achievement as covariate", is not rejected.

The second objective was to compare the adjusted mean scores of Mathematics achievement of Male and Female students by considering Pre- Mathematics achievement as covariate.

Table 2: Summary of ANCOVA of Mathematics achievement of Male and Female Students by considering Pre- Mathematics Achievement as Covariate

Source of Variance	SS _{y,x}	df	MSS _{y,x}	F _{y,x}
GENDER	.572	1	.572	0.012
Error	2730.452	57	49.645	
Total		58		

From the Table 2, it can be seen that adjusted F-Value is 0.012 with df=1/57 which fails to reach 0.05 level of significance. It indicates that the adjusted mean scores of mathematics achievement of male and female students do not differ significantly when Pre- Mathematics achievement was considered as covariate. In this context, the null hypothesis, namely, "There is no significant difference in the

adjusted means scores of Mathematics Achievement of male and female students by considering Pre- Mathematics Achievement as covariate", is not rejected

The third objective was to study the Interaction effect of treatment and gender on Mathematics achievement of students by considering Pre- Mathematics Achievement as covariate.

Table 3: Summary of 2 × 2 Factorial Design ANCOVA of Mathematics Achievement by considering Pre-Mathematics Achievement as covariate

Source of Variance	SS _{y,x}	df	MSS _{y,x}	F _{y,x}
TREATMENT * GENDER	.120	1	.120	0.012
Error	2730.452	57	49.645	
Total		58		

From the Table 3, it may be seen that the F-value is 0.002 with df=1/57 for Interaction between Treatment and Gender fails to reach 0.05 level of significance. It indicates that the Interaction between Treatment and Gender does not produce significant effect on Mathematics achievement of students when Pre-Mathematics achievement was taken as covariate. Thus, the null hypothesis,

namely, "There is no significant effect of Interaction between Treatment and Gender on Mathematics achievement of students by considering Pre- Mathematics Achievement as covariate", is not rejected.

The fourth objective was to study the effect of mathematics Anxiety on Mathematics Achievement

Table 4: Summary of ANCOVA of Mathematics Achievement of Students with high mathematics anxiety and Students with low mathematics anxiety by considering Pre- Mathematics Achievement as Covariate

Source of Variance	SS _{y,x}	df	MSS _{y,x}	F _{y,x}
Mathematical Anxiety	86.449	1	86.449	1.804
Error	2636.308	57	47.933	
Total		58		

From the Table 4, it can be seen that adjusted F-Value is 1.804 with df=1/57 which fails to reach 0.05 level of significance. It indicates that the adjusted

mean scores of mathematics achievement of students with high and low mathematics groups do not differ significantly when Pre- Mathematics

achievement was considered as covariate. In this context, the null hypothesis, namely, "There is no significant effect of Mathematics Anxiety on Mathematics Achievement of students by considering Pre-Mathematics Achievement as covariate", is not rejected

The fifth objective was to study the Interaction

effect of treatment and anxiety on Mathematics achievement of students by considering Pre-Mathematics Achievement as covariate. There were two levels of Treatment, namely, Instructional Strategy through concept mapping and Traditional Method. The students were categorized into highly anxious and lowly anxious.

Table 5: Summary of 2 × 2 Factorial Design ANCOVA of Mathematics Achievement by considering Pre-Mathematics Achievement as covariate

Source of Variance	SS _{y,x}	df	MSS _{y,x}	F _{y,x}
TREATMENT * GENDER	8.531	1	8.531	.178
Error	2636.308	57	47.933	
Total		58		

From the Table 5, it may be observed that the F-value is 0.178 with df=57 which fails to reach 0.05 level of significance for Interaction between Treatment and Anxiety. It indicates that the Interaction between Treatment and Anxiety does not produce significant effect on Mathematics achievement of students when Pre-Mathematics achievement was taken as covariate. Thus, the null hypothesis, namely, "There is no significant effect of Interaction between Treatment and Anxiety on Mathematics achievement of students by considering Pre-Mathematics Achievement as covariate", is not rejected.

CONCLUSION

The findings emerged from this study are given below:

- The Instructional Strategy for Concept Mapping in Mathematics was not found to be superior to conventional Method in Mathematics Teaching when Pre-Mathematics Achievement was taken as covariate.
- Female students were not found to be significantly different to male students in mathematics achievement when taught by Instructional Strategy for Concept Mapping in Mathematics.
- The Interaction between Treatment and Gender does not produce significant effect on Mathematics achievement of students when Pre-Mathematics achievement was taken as covariate
- Mathematics Achievement was found to be independent of Mathematics Anxiety when

groups were matched with respect to Pre-Mathematical Achievement.

- The Interaction between Treatment and Anxiety does not produce significant effect on Mathematics achievement of students when Pre-Mathematics achievement was taken as covariate.

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