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Impacts of Teaching Through MFS Approach of Synectics Model on Academic Progress in Science of Elementary Level Students

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ABSTRACT

In the school setting, the child is always pressurized to score high. In order to achieve that the student adopts rote learning and traditional way of learning. But that hinders the child's thinking process. The present study seeks to assess the effectiveness of MFS approach of Synectics Model of Teaching on Science learning for elementary level. It is very much essential for one's unique development. Synectics model of teaching is one of the special techniques made to develop the creative thinking ability of the children by means of encouraging divergent thinking through creating conceptual distance. Creative thinking ability is such a psychological construct which is more or less possessed by an individual. For this goal, a non-equivalent control group was utilized. The subjects of experiment consisted of 40 students each in experimental and control group. The findings showed that Synectics model of teaching has significant impact in science learning.

Keywords: Synectics Model of Teaching, Experimental Design, Academic Achievement, Creative thinking Ability, Psychological construct

INTRODUCTION

There is fierce competition everywhere in today's society. Children are always under pressure to do well in all aspects. Educational environment of students becomes monotonous in school, at home, in fact everywhere. In schools' teachers mainly follow lecture method that too without lesson plan. At home same picture is seen. As a result, they need private tuition, where the situation is also more or less same. They don't even get any pace to think of their own. For most of the children, teaching- learning process creates fear. They cannot enjoy. They may do good in lower classes but most of them are unable to maintain their performance. They have lost interest in education due to excessive pressure. This also hinders their mental growth especially cognitive development. The teaching learning process should be such that children find pleasure, participate actively while learning. Teaching through synectics model makes learning process approachable, casual, welcoming. Non-threating and inspiring. This model encourages divergent thinking by creating conceptual distance which helps students to improve capacity of thinking [1]. It thus justifies a logical solution and accepts the creative possibilities [2]. This paradigm is relying on metaphorical activities that, that creates conceptual distance through analogies. The Synectics model uses two distinct tactics to achieve this goal: Making Strange Familiar (MSF) and Making Familiar Strange (MFS).

Making Familiar Strange teaching strategy challenges pupils to think creatively about known concepts or items. This process enables the students to understand the subject easily, to make positive attitude and to improve their creative thinking ability [3]. There are not many research-based instances of the Synectics model of teaching technique being used in Indian class rooms. At the school level, numerous options may be provided to support students' ability to think divergently. Most of the schools used wrote learning or memorization of the content to prepare their students for good exam results. They don't even bother to ask the children if they understand the content well. The way that education is currently imparted leads less opportunity for students to think in novel ways. Convergent thinking is encouraged in school under the guise of discipline and compliance. The current study aims to investigate the impact of teaching through MFS approach of synectics model on academic progress in science of elementary level students.

1.1 Study objectives

The following are the objectives of the current investigation:

1. To find out the extent of academic progress in science of the elementary students through traditional method of teaching.
2. To study the effectiveness of MFS approach of synectics model on academic progress in science of elementary students.

1.2 Hypotheses

The study preceded with the following hypotheses:

H1: There will be significant difference in the mean scores of achievements in science in the pre-test between control group and experimental group.

H2: There will be significant difference in the mean scores of achievements in science between the pre-test and post-test for the control group.

H3: There will be significant difference in the mean scores of achievements in science between pre-test and post-test for the experimental group.

H4: There will be significant difference in the mean scores of achievements in science for post-test between control group and experimental group.

2. Methodology

2.1 Research Design

A non-equivalent control group design was adapted and it was quasi-experimental in nature. Both the experimental and control group was given a pre-test. Experimental group received a treatment. The non-equivalent comparison group i.e., the control group did not receive any treatment. After treatment both the groups were given a post test.

2.2 Sample

Ten secondary schools among the sixty in the Paschim Bardhhaman (West Bengal) were chosen by the investigator purposively. The schools more or less obvious in terms of their management style, facilities, teacher to student ratio, founding year, etc. to avoid the effect of extraneous variables. Out of these 10 seemingly equal schools the investigators chose two schools India International School, KSTP, Asansol and Srihari Global School, Kanyapur, Asansol, West Bengal at random for the trial.

Elementary level students of India International School, KSTP, Asansol, were chosen as the subjects of the experimental group, whereas those from Srihari Global School, Kanyapur, Asansol, West Bengal, were chosen as the subjects of the control group. Both the experimental group and control group consisted of 40 students. Students of class eight were considered for the study.

2.3 Tools

Parallel versions of self-made science achievement tests were employed by the investigator as to measure the progress in Science of elementary level students. The two parallel forms of the test were sent to experts for review and validation in order to obtain their endorsement about the validity and suitability of those tests for classroom use. Each test contains four parts, each covering a different set of items. Six lesson plans were also developed by the investigator to teach through MFS approach of synectics model.

2.4 Treatment:

After the pre-test experimental group received treatment. They received teaching based in the form of lessons through the MFS approach of synectics model from the investigator. Each concept from one topic was covered over a single period. A total of 24 lessons covering all the concepts belonging to the 6 contents was delivered through MFS approach of Synectics Model.

Table 1- Design of the Teaching Programme on Science: Content and Typology of Questions

Pre-test (Prepared by the Investigator) Achievement Test for Science	**Content**	**Post-test (Prepared by the Investigator) Achievement Test for Science**
	1.Crop production and management	
Part I- Question Types with Multiple Choices	2. Microorganisms	Part I- Question Types with Multiple Choices
Part II- Open ended inquiries	3. Coal and petroleum	Part II- Open ended inquiries
Part-III Concept Mapping based Questions	4. Combustion and flame	Part-III Concept Mapping based Questions
Part-IV- Assertion and Reason Questions	5. Force and Pressure	Part-IV- Assertion and Reason Questions
	6. Sound	

2.5 Procedure of Data Collection

At the start of the trial, the control group was given the Achievement Test in Science. The same was given to the students of the experimental group, on the same day during the afternoon session. After taking the pre-test, from the next day the control group was given instruction by the normal classroom instructor using traditional method of teaching. The normal classroom instructor created lesson plans for six chapters on investigator's request. Before being used, these lesson plans were checked by the investigator. The investigator began instructing the experimental group of students using synectics model of teaching technique on the same day. Each concept from one topic was covered over a single period. A total of 24 teaching days were used to cover all the concepts of the chosen contents. Achievement test in science (II) (Post-test) was administered to both the group once the lesson was over. Between pre-test and post-test administration, there was a gap of 30 days.

2.6 Statistical Techniques Employed

Descriptive statistics Mean, Median, Mode, SD, SE_D, Q, Skewness and Kurtosis were calculated for pre and post-test data. ”t” test was performed to show if there is any significant difference between the (i) mean pre-test scores of control- and experimental- group (ii) mean post-test scores of control and experimental group. Boxplot and Q-Q Plot was also provided as a part of descriptive statistics. Univariate analysis was also done with Levene’s test for equality.

3.Analysis and interpretation of data

3.1.Analysis of the Pre-test Scores of the Control and Experimental Group on Academic Achievement in Science

Concerned Mean, Median, Mode, SD, SE_D, Q, Skewness and Kurtosis are given in Table 2. Figure 1 and Figure 2 represents the Box Plot and Q-Q Plot against the pre-test data of the two groups.

Table 2: Descriptive Statistics Obtained from Pre-test Scores of the Control- and Experimental-Group in Achievement Test in Science

Groups	N	Mean	Median	Mode	SD	Skewness	Kurtosis
Pre-Experimental	40	24.475	25.500	27.00	4.883	-1.233	1.196
Pre-Control	40	24.550	25.500	25.00	4.851	-1.146	0.965

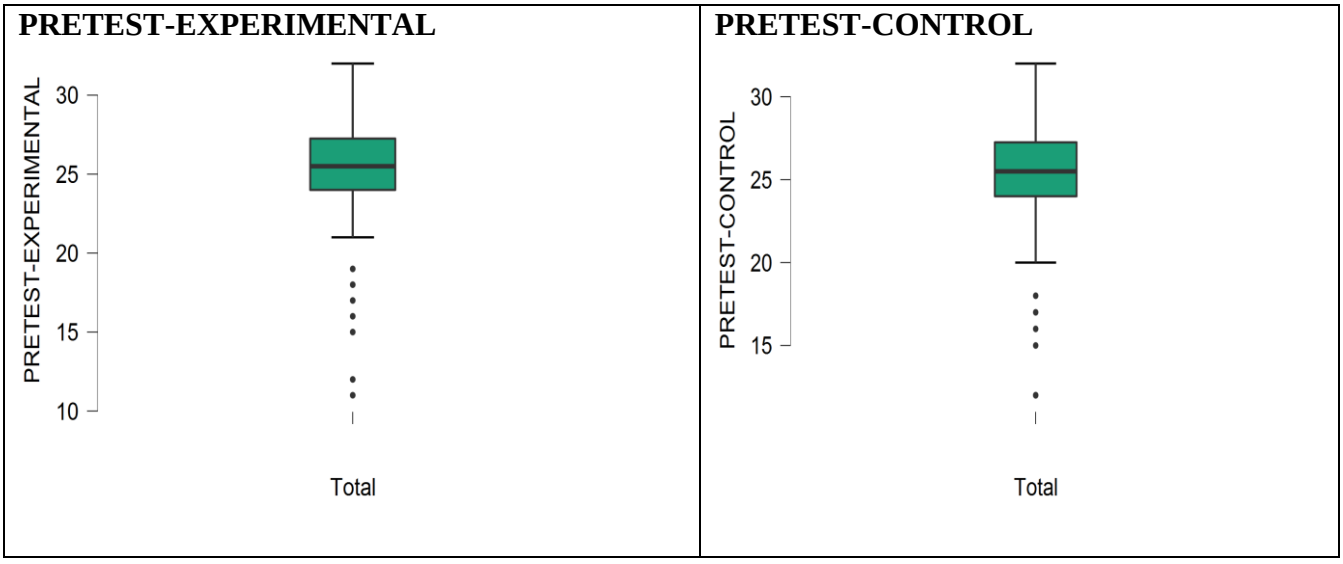

Fig. 1. Box Plot showing Pre-test Measures of Control- and Experimental- Group

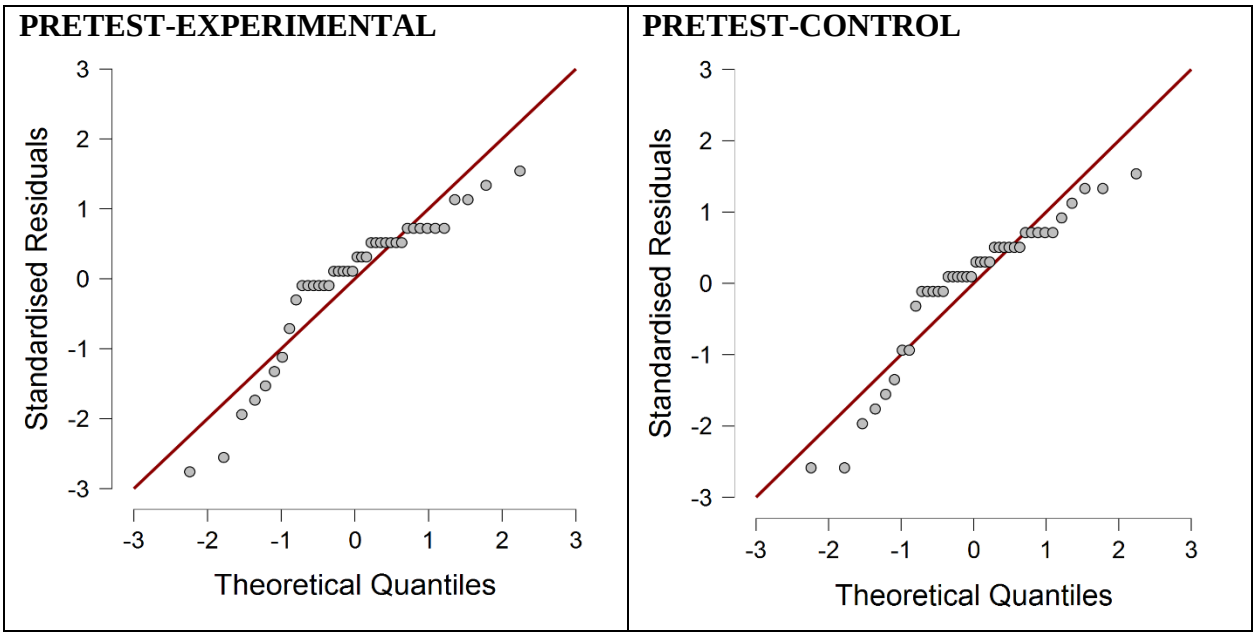

Fig. 2. Q-Q Plot for the Pre- experimental and Pre- control Groups

The descriptive measures of the scores and the two plots, box and Q-Q show how equally dispersed the control and experimental groups are.

3.2 Testing of Homogeneity

The homogeneity of this investigation was tested using Levene's Test of Equality of Error Variance to test the homogeneity variance. The result of homogeneity of dependent variable – post experimental is presented in Table 3.

Table 3: Levene's Test of Equality of Error Variance

Dependent Variable: post experimental

F	df1	df2	Sig.
0.844	22	17	0.651
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			

Table 3 supports the data for homogeneity.

3.3. Significance of Difference between Mean Scores of the Control and Experimental Groups obtained from Pre-Test

Table 4: t-Value of the Mean Differences between the Pre-Control and Experimental group in Achievement Test in science along with Other Relevant Measures

Groups	Mean	SE_D	df	t	p
Pre-Experimental	24.475	.075	39	1	.323**
Pre-Control	24.550				

**insignificant

Table 4 yields a 't' value of 1 which is not significant at 0.05 level. So, the difference between the pre-test mean scores of the control- and experimental- group in science achievement is statistically insignificant. So, the hypothesis H_1 is rejected confirming no significant difference between the Pre-Control and Pre-

Experimental groups. It may be said that both groups have nearly identical degree of intellectual accomplishment. In other words, both groups may be seen as being comparable in terms of their academic performance.

3.4 Significance of Difference between Mean Scores for the three pairs of Groups: Pre-Control & Post-Control, Pre-Experimental & Post-Experimental and Pos-Control & Post-Experimental

Significance of difference between the Pre-and Post-test mean scores of the control group and that of for the experimental groups were calculated to determine the effectiveness of the Traditional method of teaching and teaching through synectics model on the achievement in Science. Significance of difference between the Post-test mean scores of the control- and experimental- group was found out to show the comparative effects of traditional teaching methods and MFS approach of synectics model of teaching on the achievement in science. Table 5 shows the t values, along with other relevant measures of the concerning mean values.

Table 5: t values, along with other relevant measures of the concerning mean scores of the three pairs of Groups: Pre-Control & Post-Control, Pre-Experimental & Post- Experimental and Pos-Control & Post-Experimental

Groups	N	Mean	SE_D	t	p
Pre-Control	40	24.550	.050	1	.323**
Post-Control	40	24.600			
Pre-Experimental	40	24.475	0.214	7.360	<.01*
Post-Experimental	40	26.050			
Post-Control	40	24.600	0.156	9.295	<.01*
Post-Experimental	40	26.050			

*Significant, **Insignificant

Table 5 reveals (i) no significant difference between the Pre-and Post-Control group (p>.05) (ii) significant difference between (a) Pre- and Post-Experimental group (p<.01) and (b) between Post-control- and Experimental- group (p<.01) disconfirming the hypothesis H2 and confirming H3 and H4. This proves that teaching with MFS approach of synectics Model boosts achievement in science of elementary level students.

3.5. Univariate Analysis for Pre- and Post-Experimental Data

Table 6: Tests of Between-Subjects Effects

Dependent Variable: Post experimental							
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[b]
Corrected Model	899.658[a]	23	39.116	75.937	.000	1746.556	1.000
Intercept	1.031	1	1.031	2.001	.176	2.001	.265
Post test control	5.625	1	5.625	10.920	***.004****	10.920	.873

Pre test exp	11.468	6	1.911	3.710	***.014****	22.263	.851
Pre test control	1.932	5	.386	.750	.598	3.750	.204
Pretest exp * pretest control	1.322	1	1.322	2.567	.129	2.567	.325
Error	8.242	16	.515				
Total	28052.000	40					
Corrected Total	907.900	39					

***significant**

Table 6 shows significant difference for Pretest experimental with posttest experimental data. F (10.920) and F (3.710) show significant ((p=.0.004) and (p=.014)) difference between the (a) post- experimental and post- control group and (b) pre-post experimental groups and which strengthens hypotheses H4 and H3 respectively.

4. Discussion

The results of this investigation indicate that academic progress in science of the elementary students through MFS approach of synectics model is higher than those of the students taught by traditional method. This result is consistent with the results of the studies Al-Dulaimi, Al-Shorafat, and Ahmed [4,5,6] whose results showed effectiveness of the synectics model of teaching. The experimental group of students taught by using MFS approach of synectics model participated more actively in learning. This is because students were given opportunity to cultivate their creative brain through MFS approach of synectics model. On the other hand, control group of students cannot generate new idea from old ones as they have already memorized without or with a little thinking. Louie et al. [7] recommended that teachers of science may utilize the synectically designed instructional material to teach identified difficult topics in science. Synectics help in the development of creativity, training in creativity, and scholastic achievement. It is recommended that teachers and students must be familiar with synectics model of teaching and also implement this technique into teacher training institutes.

5.Conclusions

1. The synectics approach of education has a considerable impact on students' academic progress, as shown by the analysis of the data that was gathered.
2. The academic progress of the students was not significantly influenced by the traditional method of teaching.
3. MFS approach of synectics model of teaching has better impact on academic progress of students than traditional method of teaching.

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