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Effect of Interventional Strategies to Learn Geometry- A comparative study

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ABSTRACT
Mathematics is an excellent tool for developing mental discipline and for encouraging logical thinking and mental rigor. Statistics indicate that the difficulty of teaching and mastering mathematics, and geometry, in particular, has led to widespread test failure. Teachers utilize various instructional strategies to help students to focus their attention, for better comprehension and retention and to monitor and evaluate learning. The present study was done to examine the efficacy of two strategies in comparison with the with conventional (chalk and talk) method of teaching Geometry. The two experimental Intervention Strategies were (a) use of Power Point presentation (hereinafter termed as PPT) and use of Paper Folding. The study was done on one hundred and five (N=105) students of class VI in a rural Government Higher Secondary School, Coimbatore. The students were randomly assigned to three groups viz., two Experimental groups namely the (a)Power Point Group and (b) Paper Folding group (n=35) each and Conventional Group (hereinafter termed as Chalk and Talk Group, n=35) as the control group. Based on a test of Geometry, developed from the curriculum, the data was collected prior and after the Intervention for both the Groups (two Experimental groups and control). The results of descriptive statistics, Paired sample t -test and ANOVA showed that there was no significant improvement in learning Geometry in control Group whereas significant improvement in scores was found in the Paper Folding Intervention Group than the PPT Intervention Group. The comparison between the instructional strategies also showed that Paper Folding as the Instructional Strategy improved the scores in the evaluation test than the PPT and Chalk and Talk Method. The study concludes that Paper folding as an instructional strategy is highly recommended for teaching Geometry for Students of High School.

Keywords: Instructional Strategy, Chalk and Talk, Paper folding

INTRODUCTION

Geometry is a discipline of mathematics that deals with various figures and their constituent pieces. However, the math may be scary for students, especially as they go from simple arithmetic to fractions and even algebra and geometry(Ali et al., 2010; Banu, 2014).For a subject such as geometry, there is a need for infrastructure, equipment, and materials that would facilitate teaching Geometry. According to Lawal-Solarin, (2016), secondary schools lack the necessary facilities and equipment for instruction. Teachers utilise instructional strategies to help students become autonomous, strategic learners. The use of instructional strategies has become imperative to ensure student engagement and academic success. Seechaliao, (2017) states that Instructional strategy is an idea, guideline, method, or principal direction for implementing, measuring, and assessing teaching. Before being implemented, an instructional strategy must consider numerous instructional components, such as learners, learning objectives, contents, learning context, overall context, conditions, and lecturers' skills in selecting learning principles and techniques to achieve the learning objectives they specified. Though instructional strategies have been under discussion by researchers and academicians, the use of appropriate strategies for specific subjects is still a grey area and continues to be ambiguous. Students have unique needs and teachers are forced to use different strategies for a different set of students. The present study is an attempt to investigate the impact of using two instructional strategies in classrooms among secondary level school children.

As every academic subject is unique, and the same instructional strategies cannot be used for every subject. Mathematics and specifically, geometry are starkly different from most other subjects and hence needs a unique set of instructional strategies. The transfer of knowledge from a teacher to a student occurs through different channels and unique ways all of which cannot be comprehended. But the use of an effective instructional strategy may trigger the interest in a student increasing student engagement inside a classroom. Students who

are attentive in class tend to perform better in exams. In this context, there is an intrinsic link between the strategy used, student engagement and academic achievement which needs to be explored.

Objectives

To examine the efficacy of two strategies viz., Power Point presentation(PPT) and Paper Folding Intervention as an Instructional Strategy to teach Geometry and compare the same with conventional (chalk and talk) method in students of High School.

Hypotheses

H1. There will no significant improvement in learning Geometry through conventional (chalk and talk) method of Instructional Strategy.
H2. There will be improvement in learning Geometry through Power Point method of Instructional Strategy.
H3. There will be improvement in learning Geometry through Paper Folding method of Instructional Strategy.
H4. There will be significant improvement in learning of Geometry using Power Point and Paper folding method of Instructional Strategy compared to conventional (Chalk and Talk) method of Instructional Strategy.

Method

The study has adopted Experimental Pre-Post Design in a random sample of students of Class VI of Pannimadai Government Higher Secondary School, Coimbatore which is located in a rural area.

Sample

Students studying in Samma Seer Kalvi System in Class VI were chosen for the study as it was found that the conventional method of teaching Geometry resulted in poor academic performance. The study was conducted in the academic year of 2018-19. The student's past performance in mathematics in three previous years were taken into account as a baseline measure. Based on the marks scored, the following inclusive exclusive criteria were applied

Inclusion Criteria

- Students who were part of Samma Seer Kalvi System and studied in the same school for past three years were only included
- Students studying in Rural School were chosen for the study
- Students whose score were below 35 (Minimum Passing Mark) in Quarterly Mathematics Examination in the academic year of 2018-19 were chosen for the study

Exclusion Criteria

- Students who were absent for Quarterly Exam were excluded
- Students whose performance were consistently high in Mathematics but low marks in the concerned Quarterly Examination were excluded.

After applying the above Inclusion and Exclusion Criteria, it was found that one hundred and five students (N=105) were found to be eligible to be part of the study. The sample students were then tested using a test of fifty questions only on Geometry (Pre-test) which was developed based on the curriculum. The students were then randomly assigned to each Experimental group(Power Point (n=35) and Paper Folding (n=35)) and control group(n=35). For the control group, the teachers taught the conventional method (Chalk and Talk method) whereas for the Experimental Group (n=35) the researcher analysed the syllabus on first two Tri-Sem (between June to September (first Tri-Sem) and Second Tri-Sem (between October to December) to identify the Geometric Concepts to be taught and prepared the Intervention. The Geometric Concepts that need to be taught included Point, Ray, Angles, Triangles, and Symmetry.

Power Point Intervention

The researcher trained the teachers how to prepare Power Point slides and use them in teaching (Only teachers who were found to be familiar with using Power Point were used for the study). The researcher along with the teacher prepared slides of Power Point on various concepts that need to be taught included Point, Ray, Angles, Triangles, and Symmetry. The students were grouped in five or six so that all the students were able to look at the computer screen. The researcher along with the teachers used the Power Point slides along with oral teaching when the slides were presented. The intervention lasted for twelve weeks consisting sixty sessions of forty-five minutes. After the Intervention, the students were administered the same test of fifty questions (Post-test).

Paper Folding Intervention

As Multi-Modal Experiential Learning was used to learn geometry, the student was asked to form into groups of five or six based on peer affinity. On the whole six groups were formed. The classroom was changed in a play

workshop with the researcher in collaboration with the teacher gained the confidence of the students introduced with paper of various sizes and colours in the class. The students were asked to freely use the paper, (Tear, fold, and flip) exchange, and make shapes as they like. This led to free orientation with the usage of paper and allowed them to use them as they like. After half an hour of the icebreaking session, the researcher began to introduce paper folding and started to teach Point, Ray, Angles, Triangles, and Symmetry. Following twelve weeks of Intervention ranging for sixty sessions of forty-five minutes, the students were administered the same test of fifty questions.

Analysis

Thirty-five students who were selected as sample for the control group and intervention groups were administered the Pre-Test. However, two students in the Power Point (PPT) Intervention group and five students in Paper Folding Intervention group did not complete the intervention sessions due to several reasons such as absent to the school, incomplete questionnaire. As a result, 33 students became the part of PPT group and 30 students completed the Paper Folding the Intervention. Hence the response rate (RR) to the questionnaire were 94% and 87% respectively. The study included girls (n=16) and boys (n=17) for PPT Intervention group and girls (n=17) and boys (n=13) for Paper Folding Intervention group.

Similarly, in control group, three students did not attend the post-test due to various reasons such as incomplete questionnaire, absent to school. Hence, the response rate (RR) to the questionnaire was 91.4%. The control group included girls (n=20) and boys (n=12) studying in Class VI during the academic year 2018-19.

The data was analysed using SPSS trial version and the statistical analysis chosen for the study involved (a) descriptive statistics, (b) Paired sample t -test to compare the mean scores of the same subjects (prior and after the intervention period) and (c) Analysis of Variance (ANOVA) to compare the scores of the two Intervention group and control group in terms of improvement in learning among the groups after the Intervention.

RESULTS

Table 1:Mean, and Standard Deviation and Paired Sample t-test of the of the Sample (N=32) in the Conventional (Chalk and Talk) method

	N	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)
				Mean	S.D			
Chalk and Talk Pre	32	14.37	4.79	-2.47	4.05	-6.23	31	.65(NS)
Chalk and Talk Post	32	16.84	4.44					

NS- Not Significant

The above Table show that the subjects scores were almost similar in the pre and post Intervention (Mean= Pre (14.37) and Post (16.84) than in the Pre-Intervention. This shows that there was no significant improvement in the mean scores in Pre and Post Intervention Post.The results of the paired t-test which was run on a sample of thirty two students (N=32) to determine whether there was no statistically significant mean difference in the understanding of geometric concepts in both the time periods (14.37 ± 4.79) as opposed to the time period 2 (16.84 ± 4.44); a non-significant increase of 2.47 (95% CI, 12.93 to 10.00), t (31) = 6.23, p < .001.

This clearly indicates that the conventional (Chalk and Talk) method did not improve understanding geometric concepts and students were scoring poor in terms of their grades achieved in the following academic achievements. Hence, the hypothesis which states that "There will no significant improvement in learning Geometry through conventional (chalk and talk) method of Instructional Strategy" has been **accepted**.

Table 2: Mean, Standard Deviation and Paired Sample t-test of the Sample (N=33)in the PPT Intervention in the Pre and Post Intervention

	N	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)
				Mean	S.D			
PPT Pre	33	11.94	2.90	-17.47	6.76	-10.64	32	.000**
PPT Post	33	29.41	5.74					

**- Significant at 0.01 level

The above Table show that the students' scores have significantly improved from Pre to Post Intervention (Mean= Pre (11.37) and Post (29.41) than in the Pre-Intervention. This shows that there was significant improvement in the mean scores in Pre and Post Intervention Post.

The results of the paired t-test which was run on a sample of thirty students (N=33) to determine whether there was a statistically significant mean difference in the understanding of geometric concepts prior and after the intervention. There was an improvement post the intervention (29.41± 5.74) as opposed to the prior to the intervention (11.94± 2.90); a statistically significant increase of 17.47 (95% CI, 20.94 to 13.99), t (32) = 10.64, p < .001.This clearly indicates that the PPT Intervention has significantly improved understanding geometric concepts and students were able to apply the thought in improving their performance in academic assessments. Hence, the hypothesis which states that "There will be improvement in learning Geometry through PPT method of Instructional Strategy" has been accepted.

Table 5:Mean, Standard Deviation and Paired Sample t-test of the Sample (N=30)in the Paper folding Intervention in the Pre and Post Intervention

	N	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)
				Mean	S.D			
Paper Folding Pre	30	18.82	3.43	25.53	5.52	31.02	29	.000**
Paper-Folding Post	30	44.35	4.98					

**- Significant at 0.01 level

The above Table show that the subjects scored higher mean score in the post Intervention (Mean=44.35) than in the Pre-Intervention. This shows that the Intervention was able to improve in the performance of students in Post Intervention while compared to Pre-Intervention. As a result of the Intervention the students were able to better apply thought to understand the geometric concepts and could complete the test with confidence and with better results.

The results of the paired t-test which was run on a sample of thirty students (N=30) to determine whether there was a statistically significant mean difference in the understanding of geometric concepts prior and after the intervention. There was an improvement post the intervention (44.53 ± 4.98) as opposed to the prior to the intervention (18.82 ± 3.43); a statistically significant increase of 25.53 (95% CI, 27.19 to 23.87), t (29) = 31.02, p < .001.This clearly indicates that the Paper folding Intervention has significantly improved understanding geometric concepts and students were able to apply the thought in improving their performance in academic assessments. Hence, the hypothesis which states that "There will be improvement in learning Geometry through paper folding method of Instructional Strategy" has been accepted.

Table 6: Descriptive Statistics and F-Test of the Sample in the Post Test scores of the three Intervention

	N	Mean	Std. Deviation	Std. Error	F	Sig.
Chalk and Talk	32	16.87	4.44	1.32	2.16	.152 NS
PPT	33	29.41	5.74	1.39	14.01	.002**
Paper Folding	30	44.35	4.98	0.74	7.67	.008**

NS- Not Significant, **-Significant at 0.01 level

The above Table presents that comparison of the scores on the post-test between the Experimental and Control Groups after the Intervention. It was found that there was a significant improvement in the PPT and Paper Folding Intervention group compared to the Chalk and Talk Group. There was a significant difference in the mean scores with the PPT Group (Mean= 29.41, S.D = 5.74) and Paper Folding Intervention Group (Mean= 44.35, S. D =4.98) as compared to the conventional method of teaching (Mean= 25.48, S. D= 4.44). This clearly indicates that PPT and Paper folding as an instructional strategy can be used to improve the learning in Geometry among VI standard students and it can help them to better understanding of the concepts. More than the PPT, Paper folding was comparatively showed better improvement in improving the scores. Paper Folding as a play tool can also make the child develop interest towards Geometry and in Math overall. Moreover, it is an easily available teaching aid.

Based on the above findings, it has been concluded that the hypothesis which states that "There will be significant improvement in learning of Geometry using Power Point and Paper folding method of Instructional Strategy compared to conventional (Chalk and Talk) method of Instructional Strategy." has been **accepted**. In addition the paper also finds Paper Folding Instructional Strategy is better than the other two methods of teaching Geometry.

CONCLUSIONS

The study was conducted with the objective of comparing the conventional study with PPT and Paper Folding as an instructional strategy for teaching Geometry. The study found that Paper which is a very easily available material and can be made as a play tool can be very effective in teaching and learning Geometry. However, the

study has certain limitations. (a)Paper folding as an instructional strategy can be used only to teach Geometry whereas Teachers needs to devise other methods to teach other aspects of Mathematics. However, Paper folding can help to develop child's creativity and abstract reasoning skill. (b) Paper folding strategy can used to teach at secondary level geometry and may not be helpful to teach higher geometric concepts. However, the interest created and the basic foundations in geometry may lead to development of interest towards learning Geometry and may reduce the mental block towards Math in general. An improved score in mathematics as a result may help to improve academic motivation of the student. Based on the above conclusions, it is suggested that Paper folding as an instructional strategy is highly recommended to teach secondary level Geometry.

REFERENCES

1. Lawal-Solarin, E. O. (2016). Investigation of School Libraries: A case study of Private School Libraries at Ado-Odo, LGA Ogun State, South West, Nigeria**.**
2. Seechaliao, T. (2017). Instructional Strategies to Support Creativity and Innovation in Education. Journal of Education and Learning, 6(4), 201. https://doi.org/10.5539/jel.v6n4p201
3. Ali, R., Hukamdad, D., Akhter, A., & Khan, A. (2010). Effect of Using Problem Solving Method in Teaching Mathematics on the Achievement of Mathematics Students. Asian Social Science, 6(2), 257–261. https://doi.org/10.5539/ass.v6n2p67
4. Banu, D. P. (2014). Science Teacher Education Program for Effective Classroom Performance in a Changing World. International Journal of Science, Technology and Society, 2(4), 78. https://doi.org/10.11648/j.ijsts.20140204.14