An Assessment of the Level of Understanding in Geometry among Grade IV Students

L. P. Lalduhawma
Department of Mathematics, Pachhunga University College, Mizoram University.
Postal Address : Department of Mathematics, Pachhunga University College, College Veng Aizawl, Mizoram, India.

Abstract

This paper focuses the assessment of the level of understanding in Geometry among grade IV students. The research is carried out with class IV students of St. James School, Chawlhhmun, Aizawl and Holly Trinity School, Aizawl, Mizoram, India. Two working modules with two batches of students are set up on 10th August – 17th September, 2017 and 9th – 13th April, 2018. Before starting the modules pre test is conducted to identify their understanding level and perspective about mathematics especially Geometry portion. The Activity based learning was introduced during the modules and post test was conduct at the end of the modules to highlight about the modules. The result indicated that participants have a positive attitude about the course and this finding seems to suggest that more activity based learning may be introduced at elementary stage to remove the phobia of learning mathematics.

KEYWORDS: Teaching Geometry, Mathematics Education.

Introduction

Generally teachers and students have had rather negative attitude towards geometry. This attitude probably stems from three main causes: teachers have restricted concept of what geometry is, and what it trying to achieve; students perceive the classroom geometry activities as being particularly dull and boring; and standard textbook supply only a very narrow part of what should be covered in a rich geometric experience. We strongly believe that geometry can be presented in a stimulating and active manner.

Teaching in geometry portion, for student to learn it meaningfully requires the perceptive of how students construct their knowledge on various geometric topics (Battista, 1999). An important aspect of this research direction is the study of the level of students' understanding of different geometrical shapes and finding out how a student will learn geometry eagerly. Duval (1998) argues that geometry involves three kinds of different cognitive processes – visualization processes, construction processes and reasoning in relation to discursive processes – the synergy of which is necessary for proficiency in geometry. Approaching geometry from a cognitive point of view, he has distinguished four cognitive apprehensions connected to the way a person looks at the drawing of a geometrical figure: perceptual, sequential, discursive and operative (Duval, 1995). The National Council of Teacher of Mathematics (NCTM) (2000) recommends that new ideas, strategies, and research findings be utilized in teaching in order to help students overcome their difficulties in learning mathematic. We have to do much more

Geometry in primary school (Tom Cooper, 1986). Solving geometrical problems often requires the interactions of these different apprehensions, and "what is called a 'geometrical figure' always associates both discursive and visual representations, even if only one of them can be explicitly highlighted according to the mathematical activity that is required" (Duval, 2006).

Methodology

The method use in this assessment is simply based on paper pencil test and a questionnaire. There are 30 numbers of students in the two classes. As the students are only 8-10 years of age the test, questionnaire and the activities are kept as simple as it can be. The students were first put on a paper-pencil test on about their knowledge of Geometrical shapes. Even though there are types of different geometrical shapes and pattern in their syllabus still many student don't know their uses or application in real life. After this test each students answer a questionnaire from which some of the student's background were studied.

From the test and questionnaire results, we interviewed was conducted. We separated the whole classes into four (5) groups and let them draw any kinds of characters/image starting with geometrical shapes and also let them identified a kind of geometrical shapes from their surroundings. For doing this activity they measured the corner and length of the object which they find it near to them with the help of their foot-rule which improves their reasoning skill as well. Students were taken out and played games which improve their understanding skill of different shapes.

After concluding all these test and activities, we gave them a test on and post-questionnaire was conducted. Finally, post interviewed was conducted in both the batches. From these findings the final conclusion was drawn.

Result and Discussion

"Research about the learning of mathematics and its difficulties must be based on what students do really by themselves, on their productions, on their voices" (Duval, 2006). From the study of this research it is clear that when a student learnt geometry with games and activities they find it very interesting and learned it without any burden. This makes the students eager to learn and is quite challenging for the teacher to teach the students without giving them any burden. The level of understanding of geometry by the students was moderate in their standard. Some students who are thought to be weak in the subject are mostly target in the activity and Games. If not geometry is taught in the class with numbers and measurement only students will surely have more interest in this subject. But in order to upgrade their level of understanding and their interest to this topic students need some motivation from the teachers and from their family as well. It is also very clear from this assessment when a student knew the real life application of what they learnt in their schools they gained interest in the subject which drives their goal to the further studies.

Analysis of Questionnaire

The pre and post questionnaire was design to highlight student's attitude about the subject and to test their intensity of the modules. The questionnaire has 5 - Likert scale [5 – agree a lot, 4 – agree, 3 – agree a little, 2 – disagree and 1 – disagree a lot]. IBM SPSS statistics was used for analyzing pre and post questionnaire and to analyze and to interpret student's response. For the reliability, statistical technique t-test and Cronbach's alpha also known as coefficient of alpha are used to the significance of the training course and the reliabilities of the prepared questionnaires. By computing Cronbach's alpha, one basically tries to determine the amount of variance in the test result which may be attributed to true difference between students. Cronbach's alpha will increase when the correlation between the item increase. It take the values in the interval [-infinity, 1] but only non-negative values make sense (Cohen *et. al.*, 2007). Thus the reliability will be increased when alpha will become closer to one (Cohen *at. al.*, 2007, p.506).

Reliability Statistics pre-Qustionnaire.

Cronbach's Alpha	N of Items
0 .204	6

Reliability Statistics post-questionnaire.

Cronbach's Alpha	N of Items
0.389	6

Descriptive Statistics

Items	N	Minimum	Maximum	Mean	S.D
1. I know real world application of mathematics subject?	30	1	5	2.90	1.155
2. Mathematics interesting for me	30	1	4	3.10	.845
3. I can get any help at home in my studies?	30	1	4	2.90	.885
4. I understand what we taught in the classroom.	30	1	5	3.00	.947
5. I can do all my homework by myself?	30	1	5	2.90	1.185
6. I do have knowledge about different geometrical shapes?	30	1	4	2.23	.858

Table 1: Pre – Questionnaire Report for first group

Descriptive Statistics

Items	N	Minimum	Maximum	Mean	S.D
1. I know real world application of mathematics subject?	30	1	3	2.03	.669
2. Mathematics interesting for me.	30	1	5	3.30	1.179
3. I can get any help at home in my studies?	30	1	4	2.60	.814
4. I understand what we taught in the classroom.	30	1	5	2.93	1.112
5. I can do all my homework by myself?	30	1	5	3.07	1.048
6. I do have knowledge about different geometrical shapes?	30	1	5	3.07	1.230

Table 2: Pre – Questionnaire Report for second group

Descriptive Statistics

Items	N	Minimum	Maximum	Mean	S.D
1. Solving a problem group-wise is helpful?	30	3	5	4.53	.571
2. I enjoy learning mathematics with playing?	30	3	5	4.40	.621
3. I found it is fun to use some geometrical shapes for drawing things?	30	3	5	4.37	.556
4. I found it is much easier to understand learning mathematics by doing some activities?	30	3	5	4.40	.621
5. I found it is helpful to use different geometrical shapes for designing things?	30	2	5	4.13	.819
6. The module is helpful for me a lot.	30	3	5	4.27	.740

Table 3: Post – Questionnaire Report for first group

Descriptive Statistics

Items	N	Minimum	Maximum	Mean	S.D
1. Solving a problems in a group-wise is helpful	30	3	5	4.37	.809
2. I enjoy learning mathematics with playing?	30	2	5	4.07	.740
3. I found it is fun to use some geometrical shapes for drawing things?	30	1	5	3.70	1.179
4. I found it is much easier to understand learning mathematics by doing some activities?	30	1	5	3.90	.995
5. I found it is helpful to use different geometrical shapes for designing things?	30	2	5	3.50	.682
6. The module is helpful for me a lot.	30	2	5	3.87	.776

Table 4: Post – Questionnaire Report for second group

The level of student's response about the pre and post questionnaire was categorised as:

Very high when 4< Mean >5

High when 3<Mean<4

Medium when 2<Mean<3

Low when 1<Mean<2

Very low when Mean <1

In both the two group the post questionnaire No.1 has a highest response of mean greater than 4 and the pre questionnaire No.1 in the second group has the lowest response with mean 2.03 and S.D. 0.669. From the response of students in the pre and post questionnaire students are happy with working together rather than our traditional teaching methods which we practice in a classroom. We can observe that learning mathematics can be made easier and enjoyable if our curriculum includes mathematical activities and games. Knowing real world application will encourage and attract an open-minded attitude among youngsters and help them develop clarity in their thinking. Emphasis should be laid on development of clear concept in mathematics in a child, right from the elementary level.

The pre and post training score of the two groups are tested with paired t-test and is found statistically highly significance. Hence it has been concluded that the modules is effective to the students and they have been improved by giving such training which improve the significance of leaning mathematics.

Paired Samples Test

Items	Paired Differences					t	df	Sig. (2-tailed)
	Mean	S.D	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Score level of post training – Score level of pre training	1.4	0.89	0.163	1.06	1.73	8.573	29	8.573>1.69 Rejected

Table 5: Paired t –test report for first group.

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	S.D	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Score level of post training - Score level of pre training	1.83	1.28	.23	1.35	2.31	7.792	29	7.792>1.69 rejected

Table 6: Paired t –test report for second group.

Pictures of Students Performing Activities

CONCLUSION

The result indicated that participants have a positive attitude about the course and this finding seems to suggest that more activity based learning may be introduced at elementary stage to remove the phobia of learning mathematics. This study comes to make the conclusion that the student understanding of the concept of geometry is

moderate in their standard. The motivation and guidance from the teachers and family greatly affect the student interest in the subject.

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