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Statically Analysis of Impact of Study of Teaching Mathematics to Early Primary School Students using Locally Available Materials

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***Abstract*—This paper presents the study of impact of teaching mathematics to school students using locally available materials. The study is based on pre-test and post-test study on Control and Experimental groups. The control group was taught by traditional method, i.e. without using any extra teaching-learning tools while experimental group was received teaching by locally available materials as teaching-learning tools. The study has done on the students of two different schools of class 1 and 2. The data were collected using questionnaire format on different concepts like addition, subtraction and data handling. Pre-test data has collected initially without giving any instruction to the students and post-test data were collected after classroom teaching to both control and experimental groups. After analysis, it found that there are some meaningful differences between the score of control and experimental groups. The study shows that experimental group has better achievement which had received instruction by locally available materials in comparison to control group which was instructed without any teaching learning tools.**

Keywords— Introduction Resources, Mathematics, data Analysis.

I. INTRODUCTION

Education encounters, in current times, challenges in all aspects of social, financial & educational life; the most important of which are over-population, over-knowledge, education philosophy development & the change of teacher's responsibility, the spread of illiteracy, be short of the staff & the technological development & mass media [9]. The purpose of using manipulative in mathematics is to help the student understand abstract concepts. Successful use of manipulative occurs when they are used as symbols as opposed to literal representations of what they are (e.g. pattern blocks representing their shapes with no use beyond such representation). For children to gain an understanding using manipulative, they must identify the mathematical concept being learned with the manipulative used ([6, 7, 8]). Manipulative use is also seen as a way of increasing mathematical understanding. Manipulative are typically concrete objects used to represent mathematical concepts ([7, 8]) It should not be amazing that current research has established a substantial relationship between the use of calculating materials and students' achievement in the mathematics classroom. Learning theorists have suggested for some time that children's' concepts evolve through direct interaction with the environment, and materials provide a vehicle through which this can happen. This message has been conveyed in a number of ways: Piaget suggested that concepts are formed by children through a reconstruction of reality, not through an imitation of it [1]; Dewey argued for the provision of firsthand experiences in a child's educational program [2]; Bruner indicated that knowing is a process, not a product[3]; and Dienes, whose work specifically relates to mathematics instruction [4]; suggested that children need to build or construct their own concepts from within rather than having those concepts imposed upon them. Lesh has suggested that manipulative materials can be effectively used as an intermediary between the real world and the mathematical world [5].

Mathematics is the study of number, quantity and space. Therefore, the basic concepts of mathematics can be easily explained by using locally available materials. The counting is done by fingers since very large times. Hands can be used to measure the length of any solid object. The other materials like stones can be used for counting. The different types of fruits, seeds and leaves can be used to explain different geometrical shapes. These materials also can be used to explain make different patterns. These materials are easily available everywhere without spending any cost. Thus these materials may be very popular teaching-learning tools to explain different mathematical concepts. This research study describes the impacts of these materials to explain different mathematical concepts and their impact on learning enhancement.

II. METHODOLOGY

A. *Research Model*

This research work has done on early primary grade students of class 2nd standards. The research work was conducted on pre-test post-test method. Two groups two groups, control group and experimental group has taken. The study has done on concepts addition, subtraction and geometry. Before starting our research pre-test of students were taken using open-ended questionnaires. After pre-test the control group was taught by the general method while experimental group were demonstrated with locally available materials like fruits, seeds, leaves, marbles etc. After completion of course, post-test has taken.

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B. Achievement test and Data Collection

The achievement test has done on two different primary school students. To test for achievement of students 5 open ended questionnaire of 50 maximum marks were prepared on three concepts as addition, subtraction and geometry. The same questionnaires were presented to both control and experimental group students. The study has started in monsoon session. About two months time has taken to teach these concepts to the students. After completion of course, post-test has organized. Again 5 different questionnaires have prepared and same questionnaire has presented to both control and experimental group students. The data from students' achievement test were collected.

III. DATA ANALYSIS

The recorded data were processed to see the impact of locally available materials for teaching mathematics. The recorded data and their analysis have given in following tables. The result accuracy is .0000 significant digits. The performance comparison is made on Mean (average) value of total data and Standard Deviation (SD) is calculated as follows:

$$SD = \sqrt{\frac{\sum_{i=1}^{N} (x - \bar{x})^2}{N}}$$

Where x is the data item i.e. obtained marks by student, $\bar{x}$ is the Mean of data item i.e. Average marks obtained by all students and N is the total number of students.

Table1- Pre- test obtained marks by student of Control Group

Pre-Test of Control Group		
S.N	Obtained marks (maximum mark=50) x	$(x-\bar{x})^2$
1	1	164.0838
2	3	116.8457
3	2	139.4648
4	21	51.703
5	1	164.0838
6	29	230.7507
7	23	84.46492
8	5	77.60764
9	31	295.5126
10	1	164.0838
11	0	190.7028
12	21	51.703
13	23	84.46492
14	7	46.36956
15	37	537.7984
16	19	26.94108
17	2	139.4648
18	35	449.0364
19	4	96.22668
20	0	190.7028
21	24	103.8459
Mean	**13.7619**	**162.1814**

Table 1 shows the pre-test results of control group students. From the above results we can see that Mean (Average) marks obtained by simple teaching method is **13.7619**.

Table2- Post- test obtained marks by student of Control Group

Post-Test of Control Group		
S.N	Obtained marks (maximum mark=50) x	$(x-\bar{x})^2$
1	3	178.8906
2	7	87.89063
3	5	129.3906
4	21	21.39063
5	4	153.1406
6	31	213.8906
7	35	346.8906
8	9	54.39063
9	37	425.3906
10	3	178.8906
11	6	107.6406
12	23	43.89063
13	26	92.64063
14	8	70.14063
15	42	656.6406
16	2	206.6406
Mean	**16.375**	**185.4844**

Table 2 shows the post-test results of control group students. From the above results we can see that Mean (Average) marks obtained by simple teaching method is **16.375**.

Table3- Pre- test and Post-test Results of Control Group

Test	***No. of Students***	***Mean***	***Standard Deviation***	***Mean Difference***
Pre-Test	21	13.7619	12.73505	*2.6131*
Post-Test	16	16.375	13.61926	

Table 3 shows the pre-test and post test results of control group students. From the above results we can see the impact of simple teaching method is *2.6131*.

Table 4- Pre- test obtained marks by student of Experimental Group

Pre-Test of Experimental Group		
S.N	Obtained marks (maximum mark=50) x	$(x-\bar{x})^2$
1	1	422.9283
2	3	344.6674
3	16	30.97167
4	30	71.14551
5	10	133.7543
6	27	29.53683
7	19	6.580354
8	36	208.3629
9	35	180.4933
10	3	344.6674
11	1	422.9283
12	24	5.928154
13	27	29.53683
14	8	184.0152
15	38	270.102
16	29	55.27595
17	9	157.8848
18	42	417.5802
19	15	43.10211
20	18	12.71079
21	37	238.2324
22	40	339.8411
23	28	41.40639
Mean	**21.56522**	**173.5501**

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Table 4 shows the pre-test results of Experimental group students. From the above results we can see that Mean (Average) marks obtained by simple teaching method is **21.56522**.

Table 5- Post - test obtained marks by student of Experimental Group

Post-Test of Experimental Group		
S.N	Obtained marks (maximum mark=50) *x*	$(x-\bar{x})^2$
1	5	565.9389
2	8	432.2021
3	21	60.67584
4	36	51.99174
5	21	60.67584
6	32	10.3075
7	27	3.202203
8	43	201.9392
9	41	149.097
10	17	138.9916
11	9	391.6231
12	30	1.465383
13	34	27.14962
14	45	262.7813
15	38	84.83386
16	29	0.044323
17	40	125.676
18	39	104.2549
19	32	10.3075
Mean	**28.78947**	**141.2188**

Table 5 shows the post-test results of Experimental group students. From the above results we can see that Mean (Average) marks obtained by simple teaching method is **28.78947**.

Table 6- Pre- test and Post-test Results of Experimental Group

Test	***No. of Students***	***Mean***	***Standard Deviation***	***Mean Difference***
Pre-Test	23	**21.56522**	13.17384	7.22425
Post-Test	19	**28.78947**	11.88355	

Table 6 shows the pre-test and post test results of experimental group students. From the above results we can see the impact of simple teaching method is 7.22425.

Table 7- Comparison of Learning Enhancement in Control and Experimental group

Test	***Mean Difference***	***Treatment Impact***
Control	*2.6131*	4.61115
Experimental	7.22425	

By examining table 7, it can be seen that there is some meaningful difference on achievement of students of experimental group. The learning enhancement of students using locally available materials is 4.61115, that is, about 9 percent.

The results of the recorded data show that students are more successful on post-experimental processes of experimental group than post-experimental process of control group. This result can be interpreted that the receiving of lectures using local materials on student is more effective on comparison to receiving lectures by traditional approach.

IV. CONCLUSION

This research study shows that the different concrete materials which are available in our local surrounding may be very effective educational tools for mathematics learning. This study shows that there are significant changes in learning enhancement to the group of students to whom locally available materials are used to teach mathematics.

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