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A Study of Achievement in Different Mathematics Concepts in Grade III Students of Public schools in Punjab, Pakistan

Muhammad Abiodullah[•]
Dr. Rafaqat Ali Akbar [••]

ABSTRACT

The study was conducted to determine the level of achievement in different mathematics concepts i.e. number sense, algebraic function of natural number, measurement, time, currency, geometry, information handling, word problems of grade III students of public schools in Punjab, Pakistan. The sample was consisted of 800 students of 32 government schools of Punjab. The achievement test was developed based on grade III curriculum. Random sampling technique was used to select 25 students from each school. The achievement of students in different concepts is varied and mean scores of students i.e. male, female and rural, urban are different. The achievement scores in the concept of measurement, currency, geometry is above average and achievement scores in the concept of numbers, algebraic function of natural numbers, time, information and word problems are below in average. that mean score of achievement of boys is better than mean score of achievement of girls in algebraic function of natural numbers,

• * Assistant Professor, Institute of Education and Research
• ** Associate Professor, , Institute of Education and Research

measurement, currency, geometry and word problems. But there is no significant difference in mean score of achievement of boys and girls in the concept of numbers, time and information. that mean score of achievement of urban students is better than mean score of achievement of rural students in algebraic function of natural numbers, measurement, time, currency, geometry and word problems. But there is no significant difference in mean score of achievement of urban students and rural students in the concept of numbers and information.

INTRODUCTION

Mathematics is language of nature; and nature may not be understood without mathematics It plays vital role in human life. Its learning is point of focus in humans' society and is a compulsory part of curriculum from early childhood to secondary education in the entire globe. Mathematics is the science of pattern and order (Schoenfeld, 1992). Mathematics is the science of measurement, quality and magnitude (Sindu, 1992). Mathematics is considered the study of relationship among numbers, shapes and quantities. It uses signs, symbols and includes arithmetic, algebra, calculus, geometry, trigonometry. It involves calculations which is a process, estimate and plan (Chamers Essential English dictionary, 2005). Mathematics is also considered as science of reasoning and is the way to settle in mind a habit of reasoning.

Doing computation, such as long addition, subtraction, multiplication or division, is not just doing mathematics. Calculators can do the same while calculators only calculate, they cannot do mathematics. Mathematics is not only the computation but it involves a search for some order in our number system coupled with ideas about what computation means (Usiskin, Perressini, Narchisotto, & Stanley, 2003). Lehocsky, & Rusczyk (2003). explored that mental operation were needed to do mathematics. According to them identification, comparison, reasoning and power of thinking were necessary for mathematical thinking.

Piaget (1956) differentiated between the stage of concrete operations and the formal operations, which are very vital for expansion of mathematical abilities. Vygotsky (1978) gave the idea of Zone of proximal development (ZPD), which became the basis for future theories about mathematical abilities.

Krutetskii (1976) referred to individual psychological characteristics that answer the requirements of school mathematics and which influence success in the mastery of mathematics as a school subject- in particular, relatively rapid, easy, and proficiency of knowledge, skill, and habits in mathematics. He explained the following components of mathematical ability:

1. an ability to extract the formal structure from the content of mathematical problem and operate that structure
2. an ability to generalize from mathematical results
3. an ability to operate with symbols, including numbers
4. an ability for spatial concepts, required in certain branches of mathematics
5. a logical reasoning ability
6. an ability to shorten the process of reasoning
7. an ability to be flexible in switching from one approach to another, including both the avoidance of fixations and the ability to reverse trains of thought.
8. an ability to achieve clarity, simplicity, economy and rationality in mathematical argument and proof
9. a good memory for mathematical knowledge and ideas.

Normally learning of mathematics involves some memory capacity, the ability to acquire and retain knowledge while mathematics learning is beyond this concept and is a problem solving ability, the kind of insight into a problem which provides a strategy to its solution.

Keeping in view the importance of mathematics in human life, it is compulsory part of curriculum in primary schools of Pakistan. The major aims of mathematics at elementary level are :

1. to provide good start in learning mathematics
2. to provide clarity and accuracy about fundamental concepts and processes of mathematics
3. to develop interest and confidence among students into the mathematics
4. to acquaint with mathematical language and symbolism
5. to develop habits such as regularity, practice, self reliance, hardworking

(Govt. of Pakistan, Ministry of Education**,** 2006**)**

The child first experience with the number is the result of manipulation with objects. Piaget emphasis that concepts are not derived from the material

themselves but from operations performed on the material. As the child manipulates, rearranges and classifies the objects he/she observes the transformations and increasingly acquires ability to work the operations mentally and to think the transformations, to assist the learner in the formation of mathematical concepts, teachers provide the variety of instructional materials and activities in the classrooms.

Mathematics achievement is level of attainment in mathematics knowledge, comprehension, application and skills. It is usually estimated by performance on a test. Punjab Literacy Watch (1999) tested students from 31 schools (16 boys public schools, 14 girls public schools and one co-educational private school), 822 boys and 549 girls, to determine competency in Mathematics. Students did well on simple and mechanical mathematical problems. In contrast, students performed poorly on geometry, fractions, decimals, and problems solving.

Khan et al (1999) assessed learning achievement in Mathematics, for grade 4 students. The sample consisted of 2794 students from 145 schools in 28 districts. The results show that boys excelled in Mathematics as compare to girls. Urban students scored higher than rural students.

Action Aid Pakistan (1999) conducted an assessment of Mathematics on 965 students in 50 schools sampled from six districts in the four major provinces and AJK. Private schools performed significantly better than NGO and government schools in all categories. The difference between NGO and government schools was negligible. These results matched the opinions expressed in focal groups and interviews.

Pervez (1995) attempted to determine the degree to which students possess basic competencies in mathematics i.e. counting and arithmetic, mental arithmetic. The results of the study revealed that students performed better in both counting and arithmetic, mental arithmetic.

The BRIDGES (1989) project collected student achievement data from a random sample of about 11,000 students in grades 4 and found that result was a decline in Mathematics scores between 1984 and 1989.

The Primary Education Project (PEP) (1999) study compared Science and Mathematics achievement of 3,300 students of grades 4 and 5 in a representative sample of project and non-project schools in Punjab, Sindh and the North-Western Frontier Province (NWFP).

Shah (1984) summarizes the results. In all three provinces, girls scored higher in sciences while boys scored higher in mathematics. However, achievement for all groups was low and based on these results,

The summary of studies conducted in different years in Pakistan on mathematics achievement at primary level is given in table 1.

Table 1: Mathematics Achievement Scores of primary school students

Year	Sample size	Grade	Concept	Mean %	Source
1995	2582	3&5	numeracy&	69.6	Pervez
			arithmetic	67.7	
			mental arithmetic		
1995	11,563	5	mathematics	45.6	MSU
1999	965	4	mathematics	60	Action aid Pakistan
1999	2794	4	mathematics	58	Khan et al

Procedure of the Study

The purpose of the study was to find out achievement level of grade III students in different concepts of mathematics i.e. number sense, algebraic function of natural number, measurement, time, currency, geometry, information handling and word problems in publict primary schools in Punjab. Achievement test for mathematics was developed, based on grade III curriculum and text book published by Punjab Text Book Board. Items were constructed by using SOLO taxonomy and cover all topics of Mathematics' curriculum of grade III. Tests were conducted in 32 government primary schools both in male and female schools in Punjab. Twenty five students from each schools were selected as a sample. Test was administered on 800 students i.e. 400 males and 400 females at the end of their academic year when they have finished their syllabus.

Data analysis

Mean and standard deviation were calculated to find the achievement levels of different concepts and variations among achievement of students. To compare the level of achievement of students among different concepts mean scores were used. Differences in achievement of boys and girls, rural and urban students were calculated compared by applying student' t test.

Results and discussion

Table 2: **Mean and standard deviation scores in different concepts of mathematics at grade III**

Concepts	**Mean**	**SD**
Numbers	42.61	27.03
Algebraic Function of Natural Numbers	39.57	23.10
Measurement	76.36	30.90
Time	30.83	24.46
Currency	67.28	33.21
Geometry	72.41	37.86
Information	19.82	31.07
Word problems	23.76	24.02

Table 2 shows that the achievement scores in the concept of measurement, currency, geometry are above average and achievement scores in the concept of numbers, algebraic function of natural numbers, time, information and word problems are below in average. The results of the study

Table 3: **Mean and standard deviation scores in different concepts of mathematics of boys and girls at grade III**

Concepts	**Male**		**Female**		**t-value**	**p-value**
	Mean	SD	Mean	SD		
Numbers	42.54	27.03	42.68	27.07	-0.074	0.941
Algebraic Function of Natural Numbers	42.14	22.70	36.96	23.25	3.167	0.002
Measurement	79.32	31.13	73.34	30.40	2.733	0.006
Time	32.48	24.08	29.16	24.76	1.914	0.056
Currency	70.59	33.14	63.90	32.97	2.846	0.005
Geometry	68.73	40.00	76.15	35.20	-2.765	0.006
Information	19.30	31.16	20.34	31.01	-0.473	0.636
Word problems	25.81	23.90	21.66	24.00	2.438	0.015

Table 3 reveals that mean score of achievement of boys is better than mean score of achievement of girls in algebraic function of natural numbers, measurement, currency, geometry and word problems. But there is no significant difference in mean score of achievement of boys and girls in the concept of numbers, time and information.

Table 4: **Mean and standard deviation scores in different concepts of mathematics rural and urban students at grade III**

Concepts	Rural		Urban		t-value	p-value
	Mean	SD	Mean	SD		
Numbers	41.78	27.02	43.44	27.05	-0.862	0.389
Algebraic Function of Natural Numbers	35.24	23.45	43.90	21.94	-5.363	0.000
Measurement	70.32	34.45	82.39	25.55	-5.598	0.000
Time	27.11	24.27	34.55	24.11	-4.320	0.000
Currency	63.25	33.04	71.30	32.92	-3.431	0.001
Geometry	67.47	39.25	77.34	35.79	-3.695	0.000
Information	21.01	31.18	18.62	30.95	1.081	0.280
Word problems	20.30	22.81	27.20	24.73	-4.079	0.000

Table 4 reveals that mean score of achievement of urban students is better than mean score of achievement of rural students in algebraic function of natural numbers, measurement, time, currency, geometry and word problems. But there is no significant difference in mean score of achievement of urban students and rural students in the concept of numbers and information.

Recommendations

Different studies on students achievement in different mathematics concepts reveals the variation in achievement mean scores of boys and girls, rural and urban students in different mathematics concepts. Same as the conclusion drawn from this study has proved the presence of variation in achievement of male, female, rural and urban students. The following recommendations are made to improve performance and minimize these variations.

Curriculum Development

Mathematics curriculum in content in Pakistan is abstract in nature having less in utility in daily life and did not contain meaningful activates for students. In the presence of such curriculum it is difficult to acquire desired level of performance. Thus it is needed to redevelop mathematics curriculum keeping in view the national objectives.

Textbook

To attain desired targets textbooks should be developed which could motivate and stimulate students. Tex books should contain material which could involve students in different activities. Content of the text book should be according to the needs of daily utilization of mathematics.

Teacher Training

Present teacher training programme both pre-service and in-service is conventional in nature and put emphasis on behavioural approaches of teaching and learning.

It is recommended that present teacher training programmes should be modified and enhanced to include weaker areas. Mathematics teacher should also be able to develop and use activities which could help in developing cognitive abilities in the students.

Instructional strategy

Instructional style in Pakistan is conventional and teacher centered. There is a need to use student centered teaching pattern in classroom.

Instructional Material

Traditionally math instruction in classroom is carried out by solving numerical on writing Board and lecture method is used followed by drill exercise. To develop cognitive abilities and mathematical skills students are required to learn through activity. Therefore students may provided gadgets, equipment and worksheet.

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