

STUDY OF THE RELATIONSHIP BETWEEN THE MASTERY OF MATHEMATICAL BASIC SKILLS AND PROBLEM SOLVING SKILLS OF STUDENTS

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ABSTRACT

The present study is survey nature. The objectives of the study as: (1) To Study the students' mastery in mathematical basic skills, (2) To Study the students' mastery in mathematical problem solving skills and (3) To Study the relationship between the students' mastery in mathematical basic skills and their mathematical problem solving skills. It is a survey research design. All the Teachers serving in secondary schools students of Rajkot District were taken as the population of the study. Total sample were 100 (boys 50 and girls 50). The study employed a survey research method because none of the variables used in the study was manipulated but were used as they have existed. In the present study to measure the mathematical basic skills and mathematical problem solving skills of the students in mathematics, the mathematical Basic Skills Test and mathematical Problem Solving Tests for were developed by the investigator himself. Chi-square test and t-test were used to determine the significant relationship between mastery of mathematical basic skills and the mathematical problem solving skills. The study revealed that (1) the students in mastery of mathematical basic skills (MBS) were on the Medium Mastered (MM) Level, (2) the student in mastery of mathematical problem solving skills (MPSS) was on the Medium Mastered (MM) Level and (3) the students' mastery of mathematical basic skills and their mathematical problem solving skills are same.

Keywords: *Mathematical Basic Skills (MBS), Mathematical Problem Solving Skills (MPSS)*

INTRODUCTION

Students should learn how to use these facts to develop their thinking skills and solve problems. Mathematics educators have accepted the idea that that the development of problem solving ability deserves special attention and that one of the most important components in any mathematics curriculum

or program is genuine mathematical problem solving. Students' learning is limited if only routine problems are solved. If the instructor understands of the process is limited, difficulties in teaching mathematical problem solving, will arise. According to NCTM (The National Council of Teachers of Mathematics), Problem-Solving skill is

among the most important skills in which mathematical knowledge and skills are used at the highest level (Cai and Lester, 2010). Problem-Solving is an important skill student must have when they start life after graduation (Krulik and Rudnick; 1996). When solving these problems, students not only make use of their existing mathematical knowledge but they also develop them (Wyndhamn and Saljö, 1997). Problem-Solving may appear at any point in our lives. When individuals face Problem-Solving process, which is included within life at a very high rate, at school, they also face several difficulties. Problem-Solving process is explained as a complex process that requires many skills to be used together. The vision of Indonesian mathematics education states that mathematics education is devoted to understanding mathematical concepts and ideas which are then applied in routine and problem solving through reasoning, communication, and connection development inside mathematics and outside mathematics it. Based on the efficiency of the core knowledge systems for numerosities children acquire first solid mathematical concepts. When children start school, they already have a 'history' of mathematical learning and are equipped with profound mathematical knowledge. In several longitudinal studies the scope and complexity of this knowledge have been shown to be key factors for the development of mathematical knowledge, and

mathematical competences, at school age. Children with sound prior knowledge have a good chance of successfully using what is offered at school for their development. Children with poor previous knowledge, however, face the risk of developing difficulties in learning math (Landerl& Kaufmann, 2008). In this paper, I will investigate the relationship between the students' mastery in mathematical basic skills and problem solving skills.

Review of Related Literature

According to Lightner (1999), researches show an abundance of people have voiced fears in regard to the socioeconomic impacts resulting from the low academic skills of today's employees. Studies also recognize the workplace trend, of demanding ever increasing levels of mathematics, communication, and science skills from the employees. According to Math Fluency (2011), educators and cognitive scientists agree that the ability to recall basic math facts fluently is necessary for students to attain higher-order math skills. The implication for mathematics is that some of the sub-processes, particularly basic facts, need to be developed to the point that they are done automatically. If this fluent retrieval does not develop then the development of higher-order mathematics skills- such as multiple-digit addition and subtraction, long division, and fractions - may be severely impaired. Indeed, studies

have found that lack of math fact retrieval can impede participation in math class discussions, successful mathematics problem-solving, and even the development of everyday life skills. And rapid math-fact retrieval has been shown to be a strong predictor of performance on mathematics achievement tests. Bigornia (2000) determined the factors affecting the mathematical proficiency level of Grade VI pupils. Teacher competence, pupils' background and communication skills were found to have highly significant relationship with pupils' mathematics achievement. A significant relationship existed between pupils' problem solving skills in Mathematics and some teacher factors, namely, educational qualification, and possession of master's units/degree, specialized training, performance rating and strategies in teaching math. No sufficient evidence was seen to show significant relationship between pupils' skills in Mathematics and the pupil factors, mothers' educational attainment and family annual income. Lee-Chua (2006) discussed efforts spearheaded by various groups to develop a successful problem-solving culture. "We have learned to focus on certain critical variables". According to the researcher, these variables include: extensive parental support, early exposure, mental toughness, excellent master teachers, and good textbooks. Montecalvo (2000) assessed the problem solving skills and attitude in

Mathematics of Grade Six pupils in Linamon District, Division of Lanao del Norte during the school year 1999-2000. Results show that majority of the pupils had average performance in problem solving skills along fractions, decimals, and percentage. Likewise, they had a fair attitude level towards mathematics and perceived that mathematics is useful for problems in everyday life. Furthermore, significant relationship existed between pupils' performance in problem solving skills test and type of school as well as pupils' average grade in Mathematics. Finally, no significant relationship existed between pupil's performance in problem solving skills test and the following pupil-related factors, namely: family income, size of family, and attitudes toward mathematics. Silva et al (2006) investigated the factors associated with non-performing Filipino students in mathematics in selected accredited schools in the Philippines (private and public institutions from Metro Manila and provinces). Results showed that, though the students have average mental ability, they encounter difficulties attributed to reading deficiencies and learning styles.

Objectives of the study :

Objectives of the present study were as:

1. To Study the students' mastery in mathematical basic skills.
2. To Study the students' mastery in mathematical problem solving skills.

3. To Study the relationship between the students' mastery in mathematical basic skills and their mathematical problem solving skills.

Variables involved in the study :

Two types of variables were involved the study: (1) Independent variable and (2) Dependent variable.

Independent Variable. The independent variable of present study was the students' mastery in mathematical Basic Skills and mathematical Problem Solving. Three level of mastery (1) High Mastery (HM), (2) Medium Mastery (MM) and (3) Low Mastery (LM).

Dependent Variable. The dependent variables of present study were the students' mastery Scores of mathematical Basic Skills Test and mathematical Problem Solving Tests.

Operational Definitions of Terms :

Operational Definitions of Terms were as:

Mastery levels. Mastery levels are the quotient of the students' score divided by the mastery score and then multiplied by 100. This is then categorized as 75 percent - up – High Mastery (HM), 50 percent - 74 percent – Medium Mastery (MM) and 0 - 49 percent – Low Mastery (LM) based on the Mathematical Achievement Test.

Mathematical Basic Skills (MBS). Mathematical Basic skills, operationally is

used to refer to the students' ability to use the four fundamental operations in whole numbers, decimals, fractions, and percentage. In this study, it was measured with the Mathematical Basic Skills Test.

Mathematical Problem Solving Skills (MPSS). Mathematical Problem Solving Skills is the process used to obtain a solution to a mathematics question. In this study, it is measured with the Mathematical Problem Solving Test.

Question of the Study :

With reference to objective the Question framed as:

1. What will be the students' mastery in mathematical basic skills?
2. What will be the students' mastery in mathematical problem solving skills?

Hypothesis of the Study :

With reference to objective three the null hypothesis framed as:

H_{01} "There will be no significant relationship between the average scores of the students' mastery in mathematical basic skills and their mathematical problem solving skills.

Population & Sample:

All the Teachers serving in secondary schools students of Rajkot District were taken as the population of the study. Total sample were 100 (boys 50 and girls 50).

Research Method:

The study employed a survey research method because none of the variables used in the study was manipulated but were used as they have existed.

Tool of the Study:

In the present study to measure the mathematical basic skills and mathematical problem solving skills of the students in mathematics, the mathematical Basic Skills Test and mathematical Problem Solving Tests for were developed by the investigator himself based on the required competencies prescribed by the mathematics textbook Std-IX (2018) issued by Gujarat State School Textbook Board, Gandhinagar. Both tests included the comprehension of fundamental operations, i.e., addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals, and percentage. Geometry, measurement and graph competencies were included in the Problem Solving tests. The Basic Skills Test and Problem solving test were multiple-choice objective tests with four options A, B, C, and D. Each item has one correct option (the key) and three distracters.

Data Collection :

The purposive sample in consist secondary schools students of Rajkot District. The research data were provided from two test, each replied by 100 students (boys 50 and girls 50).

Statistical Technique used of analysis of the Data :

Chi-square test and t-test were used to determine the significant relationship between mastery of mathematical basic skills and the mathematical problem solving skills.

Results and Discussion :

After the collection of data, the data was organized, tabulated and analyzed. The researchers decided to apply Chi-square test and t-test for the statistical treatment of the data.

Students' mastery of mathematical basic skills (MBS) and the mathematical problem solving skills (MPSS). The Chi-square test was applied in order to draw the results are presented in Table-1

Table-1

Chi-square value of Responders with referenced to students' Mastery of MBS and MPSS.

No.	Skills	Responses/Options				χ^2
		HM	MM	LM	Total	
1.	Mathematical basic skills (MBS)	16	49	35	100	132.02**
2.	Mathematical problem solving skills (MPSS)	12	47	41	100	112.42**
*Significance $df = 2$ table value of χ^2 at 0.05 level = 5.991 **Significance $df = 3$ table value of χ^2 at 0.01 level = 9.210 HM-High Mastery, MM-Medium Mastery and LM-Low Mastery						

Table-1 illustrates that the students' mastery in mathematical basic skills calculated value of χ^2 was found to be 132.02 which is highly significant because it is greater than the table value of χ^2 at 0.05 and 0.01 levels. Hence the Medium Mastered (MM) of the students' mastery in mathematical basic skills is accepted due to the value of chi square. It means the majority of the respondents responded the Medium Mastered (MM) of the students' mastery in mathematical basic skills (MBS).

Table-1 also illustrates that the students' mastery in mathematical problem solving skills (MPSS) calculated value of χ^2 was found to be 112.42 which is highly significant because it is greater than the table value of χ^2 at 0.05 and 0.01 levels. Hence the Medium Mastered (MM) of the students' mastery in mathematical problem solving skills (MPSS) is accepted due to the value of chi square. It means the majority of the respondents responded the Medium Mastered (MM) of the students' mastery in mathematical problem solving skills (MPSS).

Relationship of between the students' mastery in MBS and MPSS. The results of Mean, SD and t- Value of the students' mastery in MBS and MPSS are presented in Table-2.

Table-2
Mean, SD and t-Value of the students' mastery in MBS and MPSS

Students	N	Mean	SD	df	t-value	p
MBS	100	60.33	32.26	98	0.91	p>0.01
MPSS	100	57.00	32.14			

The Table-2 presents a significant relationship between MBS and MPSS (t=0.91, df=98, p >0.01). Thus the null hypothesis H_{01} "There will be no significant relationship between the average scores of the students' mastery in mathematical basic skills and their mathematical problem solving skills" was rejected. It means the relationship between students' mastery in mathematical basic skills and their mathematical problem solving skills are same.

Conclusion

On the light of the findings established, the following are the conclusions formulated:

1. The students in mastery of mathematical basic skills (MBS) were on the Medium Mastered (MM) Level.
2. The student in mastery of mathematical problem solving skills (MPSS) was on the Medium Mastered (MM) Level.
3. The students' mastery of mathematical basic skills and their mathematical problem solving skills are same.

Implications and Recommendations for Further Researches :

Implications and Recommendations for Further Researches were as:

1. In teaching mathematics is to develop students' mathematical problem-solving skills.
2. Similarly, a similar study may be conducted with students from different grades.
3. Studies that aim to develop the Problem-Solving skills of students by teaching strategies or studies that investigate the readiness of high school students for such problems may be conducted by considering the scope of the non-routine problems mentioned in the new secondary school curriculum.
4. The effects of problems may be investigated with long-term studies in which the educational programs that have these kinds of problems as their focal points.
5. The researcher, a Mathematics Coordinator, considers this endeavor to be of help to school administrators, teachers, parents, and pupils in improving the mathematics performance of learners and to their future researchers.
6. The scope of the study may be extended, and a comparison may be made between students attending different high school types.

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