ORIGINAL RESEARCH PAPER

Volume-7 | Issue-10 | October-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# PROBLEM SOLVING ABILITY IN MATHEMATICS AND ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS

Education

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## ABSTRACT

Mathematics is a body of knowledge that opens up the mind to logical reasoning, analytical thinking hence improves the ability for creative thinking, deep focusing and clarity of thought and precision. But, many students often face academic failure and become more deviant in present day context. An attempt is made to know the problem solving ability among the secondary students. The present study is designed to make out the status of problem solving ability of 9th standard students. The sample consists of four hundred and thirty two IX standard students from Chennai and Tiruvallore districts, Tamilnadu. Random stratified random sampling method has been adopted for sample selection. However, the secondary (Ninth standard) students are moderate in problem solving ability and average in academic achievement in mathematics. Similarly, the ninth standard students have positive correlation between problem solving ability and academic achievement of mathematics.

## KEYWORDS

Problem Solving Ability, Achievement In Mathematics, Secondary School Students

## INTRODUCTION

Education is considered as a tool to be used for the integration of the individual into the society to achieve self-realization, develop national consciousness, promote unity, and strive for social, economic, political, scientific, cultural and technological progress. Education is a continuous process in which the society establishes to assist its members to understand the heritage of the past and to participate productively in the future. It is leading out of in- born powers and potentialities of the individuals in the society and the acquisition of skills, aptitudes, and competencies necessary for self-realization and for coping with life's problem.

Education, both formal and informal, brings about a considerable change in the behavior of people by making them aware of the world through different means. No social transformation of major importance can be dreamt of by the society inhabited by ignorant people.

## LEARNING MATHEMATICS

Mathematics is a body of knowledge that opens up the mind to logical reasoning, analytical thinking that improves the ability for creative thinking, deep focusing and clarity of thought and precision. It is the hub on which all scientific and technological studies find their bearings (James Hiebert et al. 2000). In pure sciences it is the basis and language of study, in applied sciences and technology it is an indispensible tool of analysis, with the social sciences it is a scaffold and for the Arts the light that gives consistency and completeness to its study.

The learning of mathematics in schools represent first, a basic preparation for adult life and secondly a gateway to a vast array of career choices and from the societal perspective, competence in mathematics is essential for the preparation of an informed citizen and for continuous production of highly skilled personnel required for industry, technology and science. The progress of any nation depends upon her scientific and technological advancement which can only be built on a sound mathematical education capable of making the citizens effectively functional in the natural and applied sciences. The study of Mathematics therefore will go a long way to "Equip students to live effectively in our modern age of science and technology".

Education in mathematics contributes towards the acquirement of these values: knowledge and skills, intellectual habits and power, desirable attitudes and ideals that are indispensable tools for a successful and balanced human existence.

### Problem Solving Ability

Problem solving is the frame-work or pattern within which creative thinking and reasoning take place. It is the ability to think and reason out the given levels of complexity. People who have learned effective problem solving techniques are able to solve problems at higher levels of complexity than more intelligent people who do not have such training.

The individual has yet to blossom out to perfection to bring forth all that is best in him. All development, all personal advancement is in search of Truth, the realization of the spiritual essence that is in man. Thus education cannot be confined to childhood and youth – it has to take into account the whole life of a man. So education will not be complete till one realizes the Self, the perfection. Education is through life and for life. Education must take care of the whole child, the human personality in all its aspects- physical, intellectual and spiritual.

The students in mathematics classes who do not emphasize problem solving are being deprived, as well, of the feelings of exhilaration and empowerment that come from mastering a difficult problem. They are not developing the tools and the confidence they will need to tackle the types of problems that will occur in their working and personal lives. They often fail to gain a deeper conceptual understanding that comes from constructing one's own mathematical truths through deep thinking.

### Achievement Test in Mathematics

Achievement test constitutes an importance in the evaluation programme of an educational institution. In the works of N.M. Downie (2006), "Any test that measures the attainments or accomplishment of an individual after a period of training or learning is called an achievement test"

Achievement test are designed to provide a general survey of pupil's academic attainments, knowledge and skills in a given subject. These test can be administered by the teacher in the classroom in the form of a unit test, terminal examination etc., in different subjects. These tests aim at finding out how much has been learnt or how well a task has been performed by the pupils of what has been taught in the classroom.

### Need and Significance of the Study

Therefore the investigators feel the need to show the students about good conceptual understanding of the mathematics in a problem when they choose appropriate representations, use relevant information, use mathematical terms precisely, and to help the students demonstrate their ability to use strategies and reasoning by investigating and selecting appropriate problem-solving strategies and conducting a logical, well-planned, and supported process that leads to a reasonable solution. This paper will therefore take a survey of the factors responsible for these failures, the effects on the students and future of our society and proffer means of changing the trend of students' poor performance in mathematics. In this effort, students' performances in senior secondary schools will be used as tool for analysis and investigation, and the investigators would like to carry out the present study in Tamilnadu.

Mathematics is needed in every human being in day to day life. Mathematics is essential in music, dancing, marketing, aesthetic etc. It is an important subject, it is considered as father of all sciences.

Mathematics helps the students in achieving the educational goal and objectives. The importance of mathematics is expressed in the form of values. It helps in attaining and developing various values among the child. There are certain values of teaching mathematics. The value gives meaning and strength to a person's character by occupying a central place in his life. Thus, the investigators therefore feel the need to take an in-depth study into the above mentioned facts and this project will therefore take a survey of the factors responsible for these failures, the effects on the students and future of our society and proffer means of changing the trend of students‟ poor performance in mathematics. Since no study in this particular area has been found so far, the investigators have therefore decided to take up the present study.

### Statement of the Problem

Mathematics is needed in every human being in day to day life. Mathematics is essential in music, dancing, marketing, aesthetic etc. It is an important subject, it is considered as father of all sciences. Mathematics helps the students in achieving the educational goal and objectives. The importance of mathematics and be expressed in the form of values. It helps in attaining and developing various values among the child. There are certain values of teaching mathematics. Further, it paves way to the higher studies in the field of engineering, architecture, actuarial science and so on. So, the problem under consideration is stated as follows: "A Study on Problem Solving Ability in Mathematics and Academic Achievement among Secondary School Students".

## OBJECTIVES OF THE STUDY

The following objectives have been set in the present study

1. To find out the level of Problem solving ability in mathematics among high school students.
2. To find out the level of Academic Achievement in mathematics among high school students.
3. To find the relationship between problem solving ability and academic achievement in mathematics among secondary school students.

### Hypotheses of the Study

The major hypotheses of the study are the following:

1. Problem solving ability in mathematics among high school students is low.
2. Academic achievement of high school students is low.
3. There is no significant relationship between the mean scores of Problem solving ability and Academic Achievement in mathematics of high school students**.**

## METHOD OF STUDY

In the present study, the investigators have adopted normative survey method.

### Sample

The present study involves four hundred and thirty two (220 boys and 212 girls) secondary students from various schools situated in Chennai and Tiruvallore Districts. The sample is selected by using stratified random sampling technique.

### Tools Used

In this study, the investigators used the following tools:

1. The students profile is developed by the Investigators.
2. Problem solving ability scale is constructed by PratibhaDeo and Asha Mohan (1985).
3. For achievement test in mathematics, the investigators taken the marks obtained by students in half-yearly examination.

### Problem Solving Ability Scale

Problem solving ability scale is a five point scale of Likert type. It consists of 50 statements in which 37 are positive items and 13 are negative items.

### Achievement Test in Mathematics

For the achievement test in mathematics, the investigators collected the Half-yearly examination mathematics marks of high school students from the school record.

### Administration of the Tools

Before administering the test, the necessary directions were given to the students. No time limit was given to the students and was asked to complete the inventory as early as possible.

### Statistical Techniques Used

For the analysis of the data, the following statistical techniques have been employed.

1. Descriptive analysis, and
2. Chi-square test.

## RESULTS

**TABLE 1:** Level of problem solving ability among secondary school students.

| Level of problem solving ability | N | Percentage |
|---|---|---|
| Low | 119 | 27.55 |
| Moderate | 211 | 48.84 |
| High | 102 | 23.61 |
| **Total** | 432 | 100 |

From the above table, it is revealed that 48.84 % of secondary students (N=280) involved in the study could have only moderate level of problem solving ability. Whereas 27.55 % of them could only have low level of problem solving ability and the remaining 24.61 % could achieve high level of problem solving ability.

**TABLE 2:** Level of academic achievement in mathematics among secondary school students.

| Level of academic achievement in mathematics | N | Percentage |
|---|---|---|
| Low | 133 | 30.78 |
| Average | 198 | 45.84 |
| High | 101 | 23.38 |
| **Total** | 432 | 100 |

From the above table, it is exposed that 45.84 % of secondary students (N=280) involved in the study could have only average level of academic achievement in mathematics whereas 30.78 % of them could only have low level of academic achievement in mathematics and the remaining 23.38 % could achieve high level of academic achievement in mathematics.

**TABLE 3:** Showing the relationship between problem solving ability and academic achievement of high school students.

| Comparison of Variables | N | r - Value | Correlation |
|---|---|---|---|
| Problem Solving Ability and Academic Achievement | 432 | 0.587 | Moderate |

From the above table,it is clear that the 'r' value for problem solving ability with academic achievement is 0.587. It has positive moderate correlation between problem solving ability and academic achievement.

Hence, the above hypothesis is accepted.

## DISCUSSION:

The findings of the present study indicate the presence of moderate level problem solving ability as well as academic achievement in mathematics, which is concurrent with the studies of Aggarwal (2010); Ravishankar (2013); Bin Baker (2015) and Shameem (2016). However it does not corroborate with the findings of Ehtesham Anwar (2015), he found high level of a problem solving ability in the students of secondary levels. There is a positive correlation between level of problem solving ability and achievement in mathematics. Similar findings are observed by Evans (2012); Chen Limin et al. (2013); Vista (2016); Aisha (2017); Priya (2017); Zhu (2015); Morin (2017); and Ravi Shankar (2013). Discussions of the study track the achievement in biology during the academic year and determine itself and the reports of achievement motivation construct could be successfully used to predict academic achievement. So, it clearly demonstrates that the achievement motive behaviors in the biology are strongly related to achievement.

## CONCLUSION:

The reported above findings are based on lot of researches in educational psychology. As a result, the researchers found the problem of restriction in opting the variables. For example, in this case could present only a small contribution to education field such as problem solving ability to academic success. It might be worthwhile, if the similar study is done with the students of other fields too. It is appreciated from an educational point of view, to find out how to generalizable the results are. So, it is very important to find out the academic success of the students in their very first examination and it should be applied to various subjects other than mathematics and the

problem solving ability should be done to students from universities too. This can be analysed more for scientific purposes by performing an international meta-analysis for finding problem solving ability in order to gain more specific knowledge about the relation between these instruments and academic achievement.

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