# PSYCHOLOGICAL PROBLEMS OF LEARNERS IN LEARNING MATHEMATICS AT ELEMENTARY LEVEL : A CASE STUDY

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The present study is based on the interview of 100 students (50 boys and 50 girls) of Class VII of different CBSE schools in Varanasi district. The objective of the study was to explore the psychological factors related to the learners in learning mathematics. Is only higher order intelligence responsible for learning mathematics or are there some other factors too which are responsible for learning and non-learning of mathematics at the elementary level? Focusing on the responses of each student, we found that it is not only intelligence that influences mathematics learning, but there are some other factors too which are responsible. One of the most important factors is the psychology of the learner. It proves to be a barrier in the process of learning mathematics. There were also some major psychological factors which are responsible for the outcomes of mathematics learning in both ways positively and negatively.

**Key words**

Abstract, Psychological, Mathematics



## Introduction

Mathematics is a subject of reasoning and abstract concepts. Its nature is purely logical and hierarchical. Therefore, it requires step-by-step concept clarification using different ways of thinking, which varies from person. to person. We all know that every individual has varied mental abilities as stated by Howard Gardener in his *Theory of Multiple Intelligence*. Since the abilities and ways of thinking are different in different persons, most people face problems in learning mathematics. They face problems due to their ways of thinking and perceptions towards mathematics, which they further apply in the process of learning the subject.

Mathematics is one of the important subjects in our curriculum. With a lot of learning problems to solve, it is important to throw light on the myth that mathematics is a difficult subject, which can only be studied by few. Mathematics should be considered as a subject of cerebrum magic, a subject of numbers, number games and joy, as well as the most useful subject in every sphere of our life. Some myths that have been created are— it is an extremely abstract subject that can be studied only by intelligent pepole, and this thought is the actual barrier in effective

teaching-learning process of mathematics. We all know a famous quote: "If there is a will, there is a way". We all have to believe in this, if we want to produce a number of good mathematics students across the country.

In daily teaching and learning practices, various factors contribute to good performance in learning mathematics. These include students working hard, effective instructional methods in classroom, applying effective learning skills, and being good at mathematical thinking, etc. However, there are many reasons that can cause students' difficulties in learning mathematics. For example, students with poor performance may fail in mathematical learning due to the lack of proper guidance and interest or not understanding mathematics learning. There are different types of learning difficulties in mathematics. Therefore, it is necessary to apply proper strategies not only to improve their learning but also to find out the actual cause of this decline in learning this subject because remedy can be provided only if we diagnose the problems or causes. It is well-known that teachers, curriculum, environment and other social factors related to children are responsible for their learning both positively and negatively. However, this does not happen in every case. Sometimes it could be something else, and hence, the present study is meant to research the psychology of the learner.

Several studies have investigated the prevalence of learning difficulties in mathematics due to attitude towards the subject, (Miller, 1993; Ashutosh 1989; Choudhury and Kumar; 2009 and Stella and Purushothaman,1995). Much of the work has been done based on the assumption that attitude affects mathematics achievement. The results differ according to the nature of the samples and the criteria used. The main conclusion one can draw from most studies is that many children face difficulties in mathematics, and a significant number has relatively specific difficulties related to the various dimensions of learning. Such difficulties appear to be equally common in both boys and girls.

## Need of the Study

Mathematics learning has always been a topic of debate. What are the mathematical difficulties? What kind of pedagogical practices should be adopted for better learning? What kind of teaching methods should be adopted for better learning? All these are questions of the hour. To reach a meaningfull conclusion, it is the demand of the circumstances to conduct researches that can produce answers to these fundamental questions of mathematics teaching and learning. We have found many learning difficulties, like ineffective teaching, unavailability of appropriate teaching learning materials (TLMs), and unsuitable curriculum. But there is another problem on which the present study tries to focus — psychology of the learner. Every time it is not the teaching methods, teacher and curriculum, and other related factors responsible for downfall in mathematics learning but there are some other issues related to the problem as well. There is a desperate need for this type of study or a related study to contribute to mathematics education.

Wang and Liu (2009) conducted a 'Case Study on Improving High School Students with Learning Difficulties in Mathematics'. This study focused on investigating factors that lead to learning difficulties in mathematics,

and developing strategies for improving mathematics learning of students with learning difficulties. Two types of learning difficulties were identified — learned helplessness and defensive attribution. The students enhanced their learning in mathematics with the use of appropriate strategies in the interventions.

Karimi and Venkatesan (2009) conducted a study on mathematics anxiety, mathematics performance and academic hardiness in high school students. The sample comprised 284 (144 male and 140 female) Class X students from Karnataka. Pearson correlation analysis and two independent sample t-tests are used to analyse the data. The results have revealed that mathematics anxiety has a significant negative correlation with mathematics performance but no significant correlation is detected with academic hardiness. It is also found that gender differences in mathematics anxiety are significant, whereas no significant differences are detected between boys and girls in mathematics performance and academic hardiness. This study has established the fact that the performance of students in mathematics can be perceived by mathematics anxiety and females scored slightly higher on this variable but this relation was not observed with academic hardiness.

The National Curriculum Framework–2005 emphasised that "mathematisation (ability to think logically, formulate and handle abstractions) rather than knowledge of mathematics (formal and mechanical procedures) is the main goal of teaching mathematics". It further says that "the teaching of mathematics should enhance children's ability to think and reason, visualise and handle abstractions, formulate and solve problems. Access to quality mathematics education is the right of every child." (*NCF 2005*, p. 127).

## Objective

The objective of the study is to identify the psychological problems related to the learners in learning mathematics.

## Methodology

A case study is an exploration of a "bounded system" or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context (Creswell, 1998). In the preset study, the researcher has interviewed the students, and analysed their views. It is basically a qualitative case study, based on the personal interviews of 100 (50 male and 50 female) students of Class VII of different CBSE schools in Varanasi district.

The researcher has used open-ended questions to interview the students and collect data for the study.

## Sample

Sample for the present study consisted of Class VII students of different CBSE schools of Varanasi district. For the study, those students who are having learning problems in mathematics have been randomly selected.

Table 1

| S. No | Psychological Problems/ Perceptions/ Identified Case |
|---|---|
| 1. | Learned Helplessness |
| 2. | Maths Anxiety |
| 3. | Solidity of the Subject (Content Material) |
| 4. | Apathetic towards the Subject |
| 5. | Ineffective Ways of Teaching |
| 6. | Bored Subject |
| 7. | Defensive Attribution |

## Procedure

The students were interviewed at a quiet place away from their classrooms and playgrounds. They were told that the interviewer was interested in knowing their views and experiences about 'Mathematics learning and problems they face in learning mathematics'

## Data Analysis

A critical task that the researcher faced in the analysis process was to identify the cases and summarise them in the categories of problems.

The answer to each question was written by the researcher, and finally, after the collection of responses from the students, the answers were qualitatively analysed. Then, the categorisation of the students was done on the basis of the responses analysed. Finally the analysis of the percentage in each category was calculated from the total number of students (100).

## Psychological Problems/ Perceptions/ Identified Case in the Study

### Discussions

***Case 1***

### Learned Helplessness (13%)

***What is Learned Helplessness?***

If there is hopelessness and lack of motivation to face new challenges resulting in stagnation of learning for the student due to the perceived belief, then this phenomenon, termed as 'learned helplessness' is 'helplessness' (Fowler and Peterson, 1981). According to Slavin (2003), learned helplessness is the anticipation based on the experience that one's actions will ultimately lead to failure. It is an internal factor and speaks about the student's confidence. Sometimes, learned helplessness is also related to external factors. For example, some students lack help in learning mathematics. They failed in mathematics because they rarely got any help in their learning process.

### Result

After interviewing and analysing the responses of the students of Class VII, it was found that 13 per cent of the students were suffering from learned helplessness.

Of these, 6 per cent are boys and 7 per cent are girls. They achieved academic success in certain mathematics exams. Otherwise, failures are based on uncontrollable factors, such as knowledge of mathematics and loss of interest in the subject, low ability to achieve in mathematics or lack of interest in the subject due to absence of proper guidance and care regarding maths learning. Their self-confidence and negative attribution have been a major issue of their downfall in mathematics learning.

***Case 2***

***Mathematics Anxiety (21%)***

***What is Mathematics Anxiety?***

Mathematics anxiety is a common problem. Pradeep (2006) defined mathematics anxiety as a state of a sinking feeling, uncertainty and despair at doing and understanding mathematics. Mathematics anxiety affects students' achievement and attitude towards mathematics (Hembree, 1990). As far as empirical evidence of the relationship between mathematics anxiety and achievement is concerned, correlations have been found to be negative (the higher the anxiety, the lower the achievement tends to be).

Mathematics anxiety is commonly defined as a feeling of tension, apprehension, or fear that interferes with mathematics performance. The construct of mathematics anxiety typically refers to the emotional and mental distress that occurs in some students while attempting to understand mathematics. Mostly, students suffer and put themselves on the back side of learning mathematics.

**Result**

The effect of mathematics anxiety was apparent that it has a considerable correlation with a student's success in the subject. And it also appears during interviews. Twenty-one per cent of students were suffering due to mathematics anxiety, out of which 11 per cent were boys and 10 per cent girls. They do not want to study the subject because they have a different feeling towards mathematics, we can call it mathematics anxiety.

***Case 3***

**Solidity of the Subject (Content Material) (24%)**

**What is the Solidity of the Subject (Content Material)?**

As the nature of mathematics is purely logical and sequential, it is quite different from other subjects as it demands more attention and cognition. Therefore, here, solidity of the subject means hardness in terms of concept material and its logical nature. Generally, students explained it as a tough 'subject', and this mentality proves to be dangerous in terms of mathematics learning.

**Result**

It is kind of a pre-determined idea in the mind of learners towards mathematics. While analysing the responses, it makes a clear sense that most of the students have this perception that mathematics is a tough subject. Under this category, 24 per cent of students (boys 13 per cent and girls 11 per cent) were not interested in learning mathematics because they think that it is a tough subject and cannot be handled by them at prospective levels.

***Case 4***

***Apathetic towards the subject (12%)***

***What is the apathy towards the subject?***

Apathy or dislike towards the subject matter, not in terms of content but in reference to the utility in other spheres of life. Mathematics is definitely an important school subject, but is it equally important and useful for every learner, is the emerging question from this study. The result suggests that it cannot be treated as useful and important for every student. For example a student who is interested in fine arts will definitely search the ways in arts, or any other field of life where they want to go. So, the utility and scope of mathematics for them in further studies becomes narrow, because they have decided that they are not going to study mathematics at higher levels, so why waste time in learning mathematics.

**Result**

Apathy towards the subject is thinkable and a major issue for conducting of this study, after interviewing minutely. It was found that 12 per cent of the students (5 per cent boys and 7 per cent girls) do not want to study mathematics just because they do not find its utility in future with reference to further studies, as we all know mental readiness is a key to the learning, also stated by Thorndike's Law of Readiness.

***Case 5***

***Ineffective Ways of Teaching (13%)***

***What is Ineffective Teaching?***

We have a lot of discussions, seminars and researches over what is effective teaching? What are effective pedagogy practices? What are the kinds of approaches, what are effective teaching learning materials (TLMs), and many more. Ineffective teaching refers to the case that child has not grasped the communication between him/her and the teacher. Purposeful modification in behaviour has not taken place. The interaction of thoughts, ideas and contents is not done between the learner and the teacher. These circumstances can be collectively termed as ineffective teaching.

**Result**

This is serious issue that should be considered by the teacher. Thirteen per cent of the students (6 per cent boys and 7 per cent girls) complain that they do not want to learn mathematics because there is a lack of proper teaching. They felt themselves to be in a problematic situation over who could teach them the toughest subject of their schooling and prepare them for higher mathematics.

***Case 6***

***Boring Subject (9%)***

***What is meant by Boring Subject?***

Usually, a boring subject means a subject of which people are fed up and psychologically not ready to deal with its content. But this thought of boredness is due to individual differences of the learners and varies from person to person.

**Result**

Nine per cent of the total students (boys 4 per cent and girls 5 per cent) are not interested in learning mathematics because they feel that it is a boring subject and they do not want to study it for any reason.

***Case 7***

***Defensive Attribution (8%)***

***What is Defensive Attribution?***

Some students are having 'defensive attribution,' with mathematical learning difficulties. They usually do not work hard, do not take the initiative, lose interest and always complain. For example, they complain that mathematics curriculum materials are not good enough, mathematics is boring and teachers do not teach well. Never do they try to find problems within themselves. Therefore, it is believed that students with repeated failures may develop a defensive attribution to protect themselves, or they are not guided properly towards learning mathematics.

**Result**

The researcher found that 8 per cent students (boys = 5 per cent and girls = 3 per cent) were suffering from defensive attribution. They felt that mathematics curriculum is not suitable for them. They have developed a perception towards the teacher, curriculum, school and the nature of the subject. They felt that all are mutually responsible for their failure in maths. A girl named Shambhavi, a student of Class VII of St. John's School D.L.W., said, "if I get less marks in the maths test, then I am not responsible for my failure because it is a difficult subject as compared to other subjects." The above statement gives a clear idea that she is not ready to make changes in her thoughts, she is indirectly blaming the content of mathematics rather than her own potential and hardwork.

## Conclusion

The study addressed one research objective and is an outcome of the interview of 100 students studying in Class VII of various CBSE board schools in Varanasi district of U.P. During the study, the researcher found that various kinds of perceptions, attitudes, misconceptions and psychological factors affect mathematics learning. The study focuses on seven major cases. Other cases can be considered as the sub-group of the seven cases.



**Table 2**

| S. No | Cases | Boys | Girls | Total | % |
|---|---|---|---|---|---|
| 1. | Learned Helplessness | 6 | 7 | 13 | 13 |
| 2. | Maths Anxiety | 11 | 10 | 21 | 21 |
| 3. | Solidity of the Subject (Content Material) | 13 | 11 | 24 | 24 |
| 4. | Apathetic towards the Subject | 5 | 7 | 12 | 12 |
| 5. | Ineffective Ways of Teaching | 6 | 7 | 13 | 13 |
| 6. | Bored Subject | 4 | 5 | 9 | 9 |
| 7. | Defensive Attribution | 5 | 3 | 8 | 8 |
| | Total | 50 | 50 | 100 | 100 |

The study makes an attempt to draw the picture of learned helplessness, mathematics anxiety, solidity of the subject (content material), apathy towards the subject, ineffective ways of teaching, bored subject and defensive attribution. apart from this some other factors have also come into the research, like home environment and socio- economic status. But focusing on some major factors, which are categorised into seven cases have been identified for causing poor performance in mathematics learning.

Among these the most important factor is the psychology (different ways of perceiving mathematics) of the learner and it proves to be a barrier in their mathematics learning. Effective teaching does play a role of scaffolding in the teaching-learning of mathematics and the lack of it has also proved to be challenging for the learner in learning mathematics. As many researches support the co-relation between maths anxiety and achievement, here also, it appears as a major factor in the decline of mathematics learning.

It should be concluded that every child has a lot of factors to drag him/her backward in learning mathematics. Therefore, our aim as a mathematics teacher should be to make mathematics learning cognitive fun, so that the learner can enjoy and take interest in learning it rather than treating it as a tough subject. Teachers need to develop a culture and environment for learning mathematics for every child as NCF-2005 has also recommended to 'Mathematisation'. We all can achieve it by minimising and providing proper guidance to learners because in this study it is evident that all cases are somewhere linked with improper guidance.

If we want to achieve the target of mathematics for all and want to produce young mathematicians from our arena, we have a road ahead to go.



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