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Analysis Of Students' Learning Difficulties And Fear Factors Of The Subject Mathematics

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Abstract: The swift transformation in the academic system and their impact on teachers as well as students set multiple challenges. Across the globe, mathematics is still regarded as one of the most difficult subject to learn. Certain expectations that parents or teachers place on their children cause them to become fearful of and avoid learning Mathematics. The research work presents students' fear of the subject Mathematics and its causes as well as possible treatments. The study was conducted in the Panvel (Navi Mumbai) region of the state of Maharashtra and a descriptive survey research approach was chosen. For the study, a sample of school and college students was chosen using a technique for random sampling. A questionnaire with the heading "Fear Factors of the subject Mathematics" was created and utilized to gather data. Chi-square (x^2) is used to analyse the hypothesis at the 0.05 level of significance. The primary reasons of mathematics phobia are curriculum structure, educational facilities, instructional strategies, instructors' teaching performance, usage of tools and technology, and evaluation systems.

The study findings included, among other things, the teaching style of the teachers and the teacher-student relationship and the use of harsh language against students as contributing factors to students' fear of mathematics. These issues are additionally exacerbated by internal variables like boredom, motivation, disinterest, and lack of engagement with the subject.

It is suggested, based on the findings, that effective communication is essential for both the teacher and the student when teaching and studying mathematics. And also, math teachers undergo periodic retraining to have concepts of creative methods of teaching mathematics to prevent fear.

Key Words: Mathematics, mathematics phobia, curriculum structure, teaching style, teacher-student relationship, motivation.

1. Introduction: -

Mathematics holds a vital and unique role in the curriculum as it is important for a better living of the individual. However, it is well known that the majority of students find mathematics challenging. Numerous research indicates that one of the subjects with the highest amount of negative feedback is mathematics. Students' academic experiences shape their views, beliefs, and opinions on mathematics. It has been shown that there is a high correlation between trust in oneself and proficiency in mathematics.

Mathematics is first taught formally in the first grade of primary school and this is when the roots of students' failure to learn the subject lie. It is critical that students in first grade in primary schools understand fundamental mathematical concepts from both the curriculum and learning methods. It is clear that without learning a foundation in mathematics, like Arithmetic, can potentially put schoolchildren at risk for difficulties in their future schooling. In order to avoid this as well as encourage future student development, it is essential that teachers evaluate their student's mathematical abilities. Since every new mathematical ability is based on prior knowledge and is correlated with other mathematical skills, it is imperative that learning issues in mathematics be identified in students as soon as possible and treated. It will therefore be challenging for students to understand the following material if they struggle with one of the materials. Ultimately, this will have an impact on students' capacity to grasp and understand the subject matter. Furthermore, elementary school students are in the apparent Operational stage, during which they still struggle with abstract concepts but will find it simpler to process information when it is provided to them using real things. (Febriyanti, Rani & Mustadi, Ali & Jerussalem, Mohammad. (2021). Students' Learning Difficulties in Mathematics: How Do Teachers Diagnose and How Do Teachers Solve Them? Jurnal Pendidikan Matematika. 15. 23-36. 10.22342/jpm.15.1.10564.23-36).

2.1 Causes of fear of Mathematics:

Mathematics fear can be brought on by a lack of various teaching and learning components, such as a positive attitude toward mathematics, an improved curriculum, the use of ICT in mathematics instruction, counselling, a good relationship between educator and learners, the use of students-centric methods and innovative teaching methods. It is also caused by Tests and exams (because of the constraints of performing well), people (individually, parents, educators, and learners) because of their own lack of proficiency, teachers' lack of proper knowledge and improper lecture delivery, and learners' gloomy attitudes towards the subject mathematics and its abstract essence (because it is difficult to relate all aspects of real life).

2.2 Symptoms:

Fear brought on by the thought of solving various mathematical problems is known as mathematics fear. Math fear is sometimes described as a state of stress, panic, helplessness, and mental disarray. Long-term anxieties have detrimental effects on a one's health and repercussion to lose interest in learning more about the subject. The learners may have the following symptoms:

i.) Try to avoid numbers or getting confused with numbers

ii.) choking sensation, Anxiety, depression, and panic

iii.) Sweating, trembling or Problems with breathing

iv.) Nausea, headache and fainting

v.) Immediate desire to leave classroom or Skips classes and irrational thinking

vi.) Getting nervous and stressed when assigned to solve mathematical problems

2.3 Teachers' and parents' aftermath to the Results of the Diagnosis:

Teachers and children work together to accomplish a set of learning outcomes that are outlined in the curriculum during class, which is known as the teaching process. There should be no any place for fear or anxiety in the academic process. Parents and teachers motivate themselves to assist their wards because of students' personal advancement and progression in their life. Motivation is seen as a significant component influencing how students interpret mathematics. Motivated students work harder to improve their skills. Teachers as well as parents can think about using motivation as a tactic for the sake of strengthening mathematical abilities during the academic process, as well as dispelling misconceptions among students.

Students should believe that lectures' content delivered in the lecture room is important and relevant to the actual society. Teachers can assist children understand that success and achievement rely on hard work and commitment, rather than their perceived ability to do well. Rigorous, challenging, and prolific encounter do

not imply that students should tolerate learning; rather, they refer to the chance that children have to examine many thinkable solution paths, alternatives, or patterns.

As more parents work, it's important to prioritize meaningful time with their children. Effective communication with children and in the parent-school student interaction is crucial for reducing their discomfort and distress. Parents have an idea that requiring supplementary lectures and more classes for all children would significantly diminish students' dread of math.

3. Creative Ways to Assess Math Understanding:

Fear of mathematics makes students anxious, particularly when it comes to tests or exams. This anxiety impairs their thinking and makes it difficult for them to perform as effectively. There are a number of potential factors for some of the reasons why students may acquire a phobia of mathematics earlier in life.

Mathematics Teachers should rethink student assessments in innovative methods that enable them to obtain a more comprehensive view of students' conceptual mathematical knowledge and to support instructional decision. The goal of assessments should be to advance students' mathematical understanding. Teachers should encourage students to describe a math idea or "break down a problem and explain how they reach its solution" rather than frequently assigning them to solve a series of problems. Students can document their work in three different ways: by taking a picture of their work on paper, in a Google Doc, or through video. It allows them to express their thoughts better. Students should be instructed to create videos teaching their classmates applications and concepts. To scrutinize how well students, communicate mathematical concepts, they attempt to solve a few problems from a peer's video lesson.

Teachers can conduct five-minute interviews with their students to assess their progress and provide guidance for their instruction. Making a list of the things you believe a competent student should be able to express is helpful. Writing stimulates both hemispheres of the brain, making it a potent learning tool. Students who write well also arrange and clarify their ideas. In order to evaluate their students' understanding of the subject and have a comprehensive picture of where the students are in a math unit, some teachers are assigning students to complete "reflective journaling about math concepts."

Students should be inspired to work independently at home after their written test preparation workshops are completed. Teachers must continually evaluate their work, revaluate their roles, and make necessary modifications. This is the only way to succeed in the educational system.

4. **Objectives: -**

1. To determine the primary issue with students' mathematics education.
2. To identify which student traits most, restrict their ability to study mathematics.
3. To compare the challenges that students encountered that prevent them from learning mathematics according to their gender.
4. To get an insight whether a teacher or parental participation affects a student's ability to learn mathematics.

5. Hypothesis: -

1. There exist different self-activating components that interfere with the learning of Mathematics among students in regard to their gender.
2. Parental support and expectations for their children studying mathematics vary significantly depending on the student's educational level.
3. There are notable variations in the ways that teachers interact with students who are learning mathematics.

6. Limitation of the study: -

The present study holds captivating to less than 200 samples due to time and geographical limitations

7. Literature review: -

Haokip, A., & Saroh, D. (2022) explore the challenges secondary school students face in learning mathematics, involving 150 students from St. Andrew's, St. Christopher's, and St. Mathew's schools. Results show that 86% reported difficulties, with students attributing these issues differently: those from St. Andrew's and St. Christopher's primarily cited teacher-related problems, while St. Mathew's students focused on content-related challenges. The findings aim to inform strategies to improve the academic experience for students learning mathematics.

Priyanka Thapliyal & Dr. Harbans Lal.(2020). investigate the difficulties secondary school students face in learning mathematics, categorizing challenges into personal, emotional, language, instructional, infrastructural, and workload-related issues. A total of 250 students were randomly selected, and data were collected using a self-administered open-ended questionnaire. Findings indicate significant problems linked to teaching methods, which need to be addressed. Many students lack motivation to study mathematics, often viewing it solely through an exam-focused lens, leading to fewer students pursuing mathematics in higher education.

K. Abdul Gafoor & Abidha Kurukkan. (2015). investigates the challenges faced by high school learners and educators in the learning process of mathematics, involving 200 ninth-grade students and 14 mathematics teachers. Key challenges identified include difficulties in recalling previous material, rapid forgetting, and grasping mathematical concepts. Students who find mathematics very difficult often lack effective learning strategies and self-efficacy, while those who perceive it as easier credit effective teaching and quick understanding.

Teachers pointed out that students' lack of effort, insufficient prerequisites, and reluctance to seek help contribute to the perception of mathematics as difficult. Large class sizes also pose challenges for effective teaching. The findings stress the need for teachers to engage students and make mathematics more appealing, emphasizing the importance of addressing students' beliefs and study strategies to enhance their learning experience.

Sead Resic , Maid Omerovic , Ahmed Palic. (2021). Finding out if there is a fear of mathematics, what causes it, how it shows up, and what parents can do to help students in the upper grades of Central Bosnian primary schools overcome their anxiety is the aim of this study. Two separate measures were created specifically for this study to gauge children's arithmetic anxiety from the viewpoints of parents and pupils. Since mathematics is essential for investigating and contrasting various educational systems, its accomplishments are examined in greater detail than those of other subjects. Given this significance, we need to find ways to help kids who are afraid of arithmetic. Students should not only be motivated to work, but also offer support and encouragement. In the parent-school-student relationship, communication is extremely important in preventing.

Altanchimeg Zanabazar, Amartuvshin Deleg, & Magsar Ravdan. (2023). In order to investigate the causes of math anxiety, we looked at college and university students from the Mongolian State University of Education (MSUE) and the National University of Mongolia (NUM). Through the use of the Mathematics Anxiety Rating Scale (A-MARS) and statistical analyses such as regression, correlation, and component analysis, we discovered a significant negative association between math anxiety and teacher-related factors ($\beta = -0.583$). There were lesser connections between characteristics linked to students ($\beta = -0.133$) and family ($\beta = -0.311$). The results imply that arithmetic anxiety is caused by a combination of factors, including severe workloads, out-of-date resources, poor student-teacher communication, and insufficient teaching abilities. This study emphasizes how critical it is to address these issues in order to lower anxiety and improve academic performance in mathematics.

Aguilar, J. J. (2021). The study presented here looks at the causes of students' distaste for mathematics. Pupils were asked to rate mathematics in relation to other subjects including computer science, physics, and history. Students were also asked about their motivations, attitudes, and views in mathematics. A questionnaire with multiple-choice, closed-ended (such as a forced ranking scale), open-ended, and Likert scale items was employed in a convergent parallel mixed-method approach. Lack of comprehension and a self-perception of inadequate material knowledge are two of the main reasons why students are reluctant to

learn mathematics, which results in a negative attitude. According to the students' responses, their unfavourable opinion has existed since elementary school.

Z Ardi et al 2019 J. Phys.: Conf. Ser. 1157 032095. The learning process creates individual variances during content transfer. In mathematics disciplines, these shifts indicate student difficulties in following the movement of the information and raise learning barriers. However, pupils with mathematics learning impairments are identified after the final test by an assessment of their risk factors. This study investigates the relationship between learning difficulties in mathematics and numerous factors that can cause them, including mathematical anxiety, self-efficacy in mathematics, and value beliefs. Mathematics anxiety is a complex psychological problem with numerous components. Furthermore, anxiety manifested as tension and fear of dealing with mathematics will have an impact on academic progress at school. Students' active participation in mathematics learning is influenced by cognitive and affective motivation, as well as parental and teacher support. As a result, it can be concluded that the complexity of psychological symptoms of anxiety toward mathematics plays an important role in the smooth process of student learning in school.

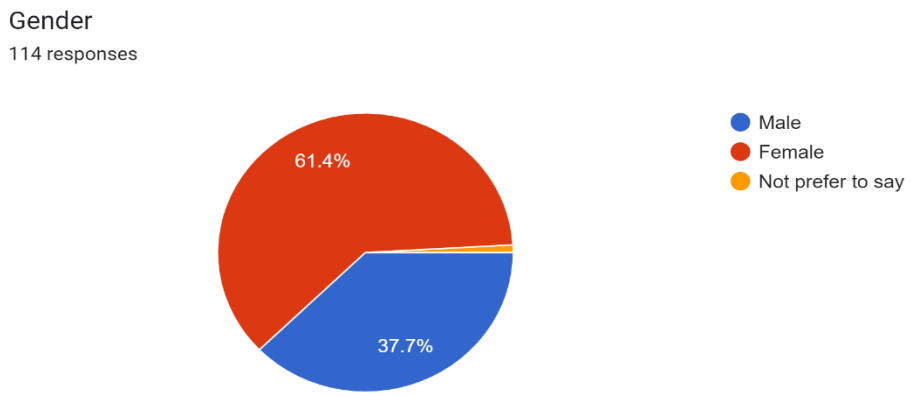
8. Research Methodology: -

- **Method of Study**: The present study adopts descriptive method of research.
- **Population:** School and college students are taken as a population of the study those are making Mathematics as a core subject in higher secondary schools in Panvel.
- **Sample**: The sample consisted of around 105 students of Secondary schools, higher secondary Schools and college students in Panvel. Stratified random sampling method was employed. At least 10 students from a school or a college were taken.
- **Tools and procedures for data collection**: Close-ended Questionnaire were used for data collection. Questionnaires were explained before distribution among the students in the peaceful environment of classroom after getting permission from the respective principals.

Courses of actions for data analysis: Proper Statistical techniques were used for present study. Data collected was tabulated taking overall frequency and according to gender too. Tables and figures were created to aid in comprehension.

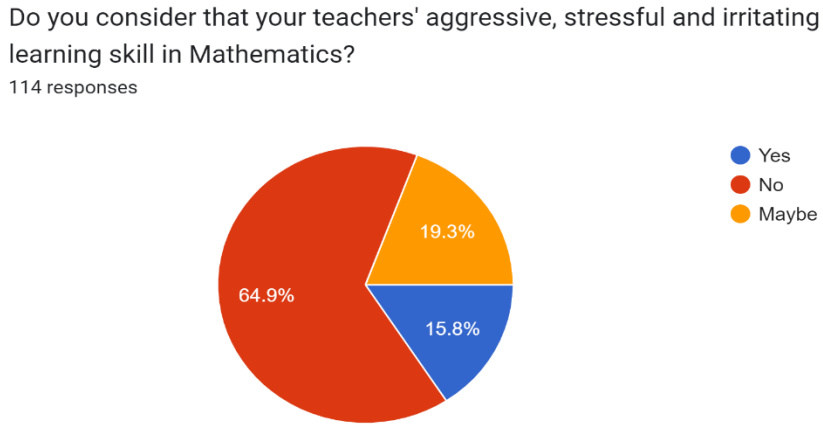
9. Data Analysis: - The results of a questionnaire were used in this investigation to determine fear factors of Mathematics, to diagnose students' learning difficulties in Mathematics' and how to effectively overcome them.

9.1. Figures and Tables:



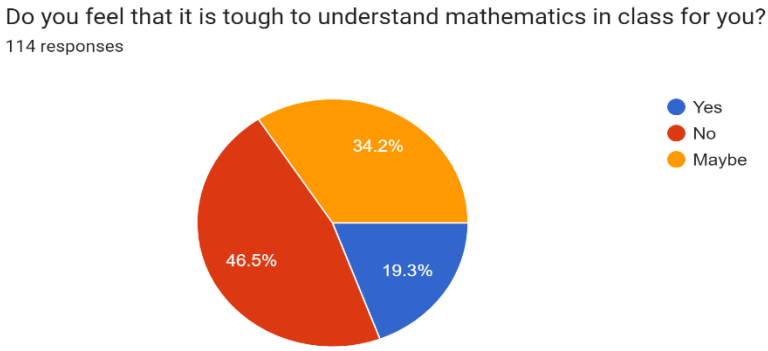
Graph 1

No. of Male: 43, No. of Female: 70



Graph 2

The graph represents that there are only 15.8% students among respondents who consider that teacher's aggressive, stressful and irritating characteristics affect their learning skill in Mathematics.



Graph 3

a. Gender * Feelings Cross tabulation

Count

		Feelings					
		1	2	3	4	5	Total
Gender	Female	11	10	21	11	12	65
	Male	5	6	13	7	7	38
Total		16	16	34	18	19	103

Table 1.1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.278[a]	4	.991
Likelihood Ratio	.283	4	.991
N of Valid Cases	103		

Table 1.2

The data shows that there is no significant impact of gender or age-group on feelings whenever students are asked to solve a mathematical problem.

b. Gender * Facing Weak Teaching Method Cross tabulation

Count

		Weak Teaching Method			
		Maybe	No	Yes	Total
Gender	Female	29	26	11	66
	Male	13	16	10	39
Total		42	42	20	105

Table 2.1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.693[a]	2	.429
Likelihood Ratio	1.682	2	.431
N of Valid Cases	105		

Table 2.2

The data shows that Students are not facing weak teaching methods for the subject Mathematics respective of their gender or age.

c. Age * Reason Cross tabulation

Count

		Reason				
		Inability to solve too much home assignment	Negative attitude towards mathematics	Use of abusive words by teacher	Weak mathematics background	Total
Age	12-14	2	5	0	8	15
	14-16	0	0	1	0	1
	16-18	6	7	0	7	20
	18-20	16	11	5	27	59
	8-10	1	3	2	4	10
Total		25	26	8	46	105

Table 3.1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.990[a]	12	.038
Likelihood Ratio	17.314	12	.138
N of Valid Cases	105		

Table 3.2

a. 15 cells (75.0%) have expected count less than 5. The minimum expected count is .08.

The data shows that there is a significant impact of age groups of students behind their fear of Mathematics.

d. Age * Mathematical Task Cross tabulation

Count

		Task					
		Addition/ Subtraction	Counting Numbers	Multiplication /Division	Remembering Table	Word Problems	Total
Age	12-14	0	1	3	5	6	15
	14-16	0	0	0	0	1	1
	16-18	1	0	1	3	15	20
	18-20	5	1	4	11	38	59
	8-10	1	0	3	4	2	10
Total		7	2	11	23	62	105

Table 4.1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.647[a]	16	.287
Likelihood Ratio	19.163	16	.260
N of Valid Cases	105		

Table 4.2

a. 19 cells (76.0%) have expected count less than 5. The minimum expected count is .02.

The data shows that there is no significant relation between age groups of students and the difficulty level of tasks assigned to them.

e. Gender * Difficulty level Cross tabulation

Count

		Difficulty level			
		Maybe	No	Yes	Total
Gender	Female	22	21	27	70

Male	14	10	19	43
Total	36	31	46	113

Table 5.1

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.659[a]	2	.719
Likelihood Ratio	.667	2	.717
N of Valid Cases	113		

Table 5.2

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.80.

The data shows that there is no significant impact of gender on considering difficulty level of the course Mathematics in their syllabus.

10.1. Findings:

1. The participation of respondents according to their gender are 61.4% male students and 37.7% female students within the age group of 8-20 years.
2. Factors contributing to students learning challenges include their insufficient comprehension of the concepts presented by teachers.
3. The challenges students have in performing multiplication/division and in using/learning mathematical formulas.
4. Students exhibit a reduced ability to analyse word problems.
5. Students express a lack of focus, demonstrate a disinclination towards Mathematics, and see it as challenging without making an effort.
6. Other factors that increase fear are students' embarrassment to ask questions, lack of practice, and poor study habits.
7. Students' difficulties with learning may be affected by the teacher's instructional methods and a deficiency of originality and innovation and expressiveness in conveyance study material.

10.2. Suggestions:

It is essential for educationalist to recognize the challenges and their origins faced by students, enabling them to formulate strategies to address these issues to design plans to overcome them.

Teachers can use tests, observation, and discussion to diagnose students who struggle with learning mathematics. They should respond to the findings of the diagnostic of their students' math learning issues in a number of ways, such as by implementing remedial instruction, extending the number of learning hours, offering one-on-one tutoring, and involving the mentees in the learning process.

With the intention of helping students who struggle with mathematics comprehend the topic, teachers may decide to assign more and more assignments or exercises with related questions and concepts. Nonetheless, practice problems are provided during class instruction under the teacher's supervision and direction.

11. Conclusion:

Students of various grade levels often have a negative attitude towards mathematics, regardless of their ability or expertise. This study aimed to understand why students had a negative attitude towards the subject mathematics, regardless of their educational achievements, and when they realized it wasn't their favourite subject. The students' initial reason for having an unenthusiastic behaviour toward mathematics was their own evaluation of their mathematical competence. This indicates that the learners recognized their lack of subject basic concepts and fundamental understanding. This dearth of information is most likely a reflection of what the pupils haven't been exposed to since the foundational ideas were developed. By dispelling

misconceptions and organizing students' mathematical knowledge acquisition, teachers can then concentrate on enhancing their perspectives on mathematics.

The mathematics teachers should implement strategies to address gaining an understanding of the subject Mathematics, including conducting remedial sessions, assigning supplementary tasks, extending learning hours, offering individualized attention and pedagogical tools, consulting with students' parents, and engaging students in the learning process by prompting them to solve problems on the board under the teachers' guidance. Students can receive one-on-one tutoring by adding extra learning time to their schedules after school. Teachers should praise students not only for correct answers, but also for their efforts in providing a solution to a task, even if it still requires improvement.

Parents have a responsibility to mentor and watch over their children while they study at home. Parents can also give their children access to resources that help them learn, such extra lessons with their parents or private tutoring. Teacher motivation, parental support, and other factors all have a remarkable positive impact on student skill, enjoyment, motivation, and achievement.

12. Acknowledgement: I would like to express my sincere gratitude to my colleagues and friends for their encouragement and assistance.

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