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Mathematical Anxiety Among Adolescents and Its Relation with Logical Thinking: A study

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Abstract:- Many of the adolescents have disinterest in Math. It may be because of fear of Math, disinterest in subject or the way in which the particular subject is being taught. Many of the parents are very rigid about math based courses. They want that their wards should pursue Math based courses without thinking about their anxiety regarding math and also their ability to think logically. Math solutions require lot of Logical Thinking. Hence it is very important to find out whether Mathematical Anxiety really hampers their Logical Thinking. That is why the researcher felt the need to take up this study.

The main objectives are to find out the level of Mathematical Anxiety and the level of Logical Thinking among adolescents and to compare them on the basis of sex and area. To identify whether adolescents with high and low Mathematical Anxiety differ on Logical Thinking and to study relationship between Mathematical Anxiety and Logical Thinking among adolescents from Schools of only four districts of Vidarbha region of Maharashtra namely Nagpur, Wardha, Chandrapur, Gadchiroli. Only 600 students from class X have been studied.

The main findings of the study are boys and girls do not differ significantly regarding Mathematical Anxiety but urban and rural Adolescents differ significantly regarding Mathematical Anxiety. There is no significant difference regarding Logical thinking on sex basis. Even urban and rural adolescents do not differ significantly regarding Logical Thinking. Adolescents with high and low Mathematical Anxiety significantly differ on Logical Thinking except for rural adolescents who do not differ significantly. There is significant inverse relationship between Mathematical Anxiety and Logical Thinking of adolescents but boys do not have significant relationship.

The key words : - Mathematical Anxiety and Logical Thinking.

Introduction :- In twenty first Century, there is tremendous advancement in science and Technology. Modern Society has become immensely competitive. Particularly in the developing nations like India, we often see the trend of parents and mentors pressurizing aspirants to choose either math or science based courses without considering the interest and caliber of the adolescents. This rigidity of parents brings in different kinds of Stress, Pressure and Anxiety emanating from the need of selecting the right stream for their degree. Many of the adolescents have disinterest in Math. It may be because of fear of Math, disinterest in subject or the way in which the particular subject is being taught. The young adults seem to be very reluctant and repulsive in pursuing the math based courses. This repulsiveness or fear may lead to Mathematical Anxiety. This anxiety has been defined by the scholars as follows:

1) Tobias and Weissbrod (1980): Mathematical Anxiety has been defined as

the panic, helplessness, paralysis and mental disorganization that arises amongst some people when they are required to solve mathematical problems.

2) Robinson and Simone (1976): have defined Mathematical Anxiety as

“Feeling of tension and anxiety that interferes with manipulation of numbers and solving of problems in a wide variety of ordinary life and academic situations”

Logical Thinking is employed several times every day, even to make plans for routine juggle tasks. In Math, Logical thinking is needed immensely.

Logical thinking is the mental process that requires reasoning in solving complex situations.

If the adolescent has Mathematical Anxiety, we need to understand if it influences the logical thinking. The above questions inspired the researcher to take up this study.

Review of the earlier studies:-

Review of the earlier studies indicated that many of the researchers have worked on Mathematical Anxiety and Logical Thinking but separately.

In a study Marianne B. Dagaylo- AN*, Noel P Tancinco (Jan2018) on Mathematic Anxiety found that almost one-half or 48.5 percent of the students was rated “Good” as school grades in Mathematics; 86 percent had favourable attitude towards Mathematics. Sehar Mangi, and Dr. Shahid Hussain (2018) conducted an analysis of Mathematics Anxiety among B.Ed. students of district Sukkur of Sindh Pakistan. The findings revealed that the huge number of student- teachers have mathematics anxiety due to bad experience in Mathematics classroom experience caused by the teacher’s traditional attitude and traditional strategies of teaching. In a study on Logical Thinking in Mathematics of secondary school students in Pakistan (January- June 2017), the results showed that performance of private school students was significantly better than students of public school, where as boys and urban students performed well than girls and rural students respectively. In An Analysis of Mathematics Teacher Candidates’ Logical Thinking Level: Caste of Turkey(February, March, April-2013), the Logical Thinking level of Mathematics teacher candidates were affected significantly by variables of grade level and high school type but not by gender.

Significance of the study:-

The disinterest in Math and fear of failure takes the adolescent away from Math based courses. It is really a mental block. Hence it is very important to find out whether Mathematical Anxiety really hampers their Logical Thinking. The Adolescents who are on the verge of choosing their stream will definitely be benefitted with the findings of the study. That is why the researcher felt the need to take up this study.

Statement of the problem:-

Topic:-

A Study of Mathematical Anxiety Among Adolescents and Its Relation With Logical Thinking.

Objectives:

The detailed objectives are as follows:

1. To find out the level of Mathematical Anxiety among Adolescents.
2. To compare Mathematical Anxiety on gender basis.
3. To study the difference in Mathematical Anxiety among adolescents from rural and urban areas.
4. To find out the level of Logical Thinking among adolescents.
5. To compare Logical Thinking on the basis of gender.
6. To study the difference in Logical Thinking among adolescents from rural and urban areas.
7. To identify whether adolescents with high and low Mathematical Anxiety differ on Logical Thinking.
8. To study relationship between Mathematical Anxiety and Logical Thinking among adolescents.

Hypotheses of the Study:

The following Null Hypotheses have been formulated by the investigator.

- 1) Boys and Girls do not differ significantly on Mathematical Anxiety.
- 2) Rural and Urban adolescents do not differ significantly on Mathematical Anxiety.
- 3) There is no significant difference in Logical Thinking on gender basis.
- 4) Adolescents from rural and urban areas do not differ significantly on Logical Thinking.
- 5) Adolescents with high and low Mathematical Anxiety have no significant difference in Logical Thinking.
- 6) There is no significant relationship between Mathematical Anxiety and Logical Thinking among adolescents.

Scope and Delimitations of the study:-

A) Scope:

- 1) The scope for the study was adolescents from four districts namely Chandrapur, Gadchiroli, Nagpur and Wardha.
- 2) The study considered Variables, Mathematical Anxiety and Logical Thinking.

B) Delimitations:

- 1) Adolescents from Schools of only four districts of Vidarbha Region namely Nagpur, Wardha, Chandrapur, Gadchiroli were selected for the study.
- 2) Only 600 students from Class X have been studied.
- 3) Only Class X students have constituted the sample for the study.

Methodology:

Research design:-

- a) Method:- For this study Normative a survey method is used.
- b) Area :- The area of the study will be Vidarbha region of Maharashtra.
Total Four districts namely Nagpur, Chandrapur, Wardha and Gadchiroli constituted the area for the study.
- c) Population:- Population for the research was the adolescents studying in class X of four districts of Vidarbha region.
- d) Sample:- Description of sample for the study is as follows:
 - 1) Total 600 adolescents studying in class x from different schools in 4 districts from Vidarbha region namely Nagpur, Chandrapur, wardha and Gadchiroli has constituted the sample.
 - 2) 300 boys and 300 girls have been taken for the study.
 - 3) Equal no. of adolescents from urban and rural areas have been taken.

Tools:-

The following tools were used for data collection.

- a) Mathematics Anxiety Scale by S Karimi and S. Venkatesh.
- b) Logical Thinking Test by Sujit Kumar and Shikha Tiwari.

Analysis and interpretation:-

The above said tools were used to collect the data and scores of individual adolescent were calculated according to the instructions given in the manual of each tool. The scores obtained were put in the form of table. By using statistical measures such as Standard Deviation, t-Test and Coefficient of Correlation, the analysis was done and interpreted.

1) Table No.1:- Shows no. of Adolescents with High, Average and Low Mathematical Anxiety.

Category	No.	High	Average	Low
Boys	289	29	207	53
Girls	279	24	215	40
Urban	287	17	212	58
Rural	281	36	210	35
Total Adol.	568	53	422	93

Analysis:- Table no.1 shows no. of Adolescents With High, Average and Low Mathematical Anxiety. Out of 289 boys, 29 have High, 207 have Average and 53 have Low Mathematical Anxiety. Out of 279 Girls, 24 have High, 215 have Average and 40 have Low Mathematical Anxiety. Out of 287 Urban Adolescents, 36 have High, 212 have Average and 58 have Low Mathematical Anxiety. Out of 281 Rural Adolescents, 36 have High, 210 have Average and 35 have Low Mathematical Anxiety. Out of 568 total Adolescents, 53 have High, 422 have Average and 93 have Low Mathematical Anxiety

2) Table no. 2 shows no. of adolescents with High, Average and Low Logical Thinking.

Category	No.	High	Average	Low
Boys	289	76	103	110
Girls	279	84	67	128
Urban Adol.	287	82	94	111
Rural Adol.	281	78	76	127
Total Adol.	568	160	170	238

Analysis:- Table no.2 reveals the no. of Adolescents With High, Average and Low Logical thinking. Out of 289 boys, 76 have High, 103 have Average and 110 have Low Logical thinking. Out of 279 Girls, 84 have High, 67 have Average and 128 have Low Logical thinking. Out of 287 Urban Adolescents, 82 have High, 94 have Average and 111 have Low Logical thinking. Out of 281 Rural Adolescents, 78 have High, 76 have Average and 127 have Low Logical thinking. Out of 568 Adolescents, 160 have High, 170 have Average and 238 have Low Logical thinking.

Table No. 3 reveals Mean, S.D. and “t” values of Mathematical Anxiety among adolescents.

Category	No.	Mean	S.D.	“t” value
Boys	289	84.01	16.46	0.51
Girls	279	84.97	15.77	
Urban Adol.	287	81.45	16.03	4.85**
Rural Adol.	281	87.58	15.63	

“t”* Significant at 0.05 level. “t” ** significant at 0.01 level.

Analysis:- As “t” is insignificant at both levels, it implies that Boys and Girls do not differ significantly regarding Mathematical Anxiety. Urban and Rural Adolescents differ significantly regarding Mathematical Anxiety as value of “t” is significant at both levels.

4)Table No. 4:- Shows Mean, S.D. and “t” values of Logical Thinking among adolescents.

Category	No.	Mean	S.D.	“t” value
Boys	289	26.81	10.04	1.18
Girls	279	25.75	11.33	
Urban Ado.	287	26.78	10.54	1.11
Rural Ado.	281	25.78	10.85	

“t” * Significant at 0.05 level. “t” ** significant at 0.01 level.

Analysis:- As “t” is insignificant at both levels, it implies that Boys and Girls and even Urban and Rural adolescents do not differ significantly regarding Logical thinking as “t” is insignificant at both levels in both the cases.

Table No.5 reveals “t” values of Logical Thinking among adolescents with High and Low Mathematical Anxiety

Category	“t” values
Boys	1.60
Girls	3.94**
Urban Ado.	2.84**
Rural Ado.	1.89
Adolescents	3.71**

“t” * Significant at 0.05 level. “t” ** significant at 0.01 level.

Analysis:-Table No.5 clearly shows that Adolescents with high and low Mathematical Anxiety significantly differ on Logical Thinking. Only the Rural adolescents do not differ significantly as “t” is insignificant in their case.

Table No.6 shows “r” values of Mathematical Anxiety and Logical Thinking among adolescents.

Category	“r” values
Boys	-0.114
Girls	-0.252**
Urban Ado.	-0.223**
Rural Ado.	0.135*
Adolescents	-0.185**

“r” * Significant at 0.05 level. “r” ** significant at 0.01 level.

Analysis:- Table No. 6 shows that adolescents have significant inverse relationship between Mathematical Anxiety and Logical Thinking (Rural adolescents at 0.05 level). Only boys do not have significant relationship.

Conclusions and Discussions:-

The analysis of the data leads to the following conclusions:-

1) The Percentage of the adolescents having high Mathematical Anxiety is 9.33, 74.3 have average and 16.37% have low Mathematical Anxiety. The study by Sehar Mangi, and Dr. Shahid Hussain (2018) also revealed that the huge number of student- teachers have mathematics anxiety.

2) 28% adolescents have high, 30% have average and 42% have low Logical Thinking.

3) Boys and Girls do not differ significantly regarding Mathematical Anxiety. Urban and Rural Adolescents differ significantly regarding Mathematical Anxiety

4) There is no significant difference regarding Logical thinking on gender basis. Even Urban and Rural adolescents do not differ significantly regarding Logical Thinking.

5) Adolescents with high and low Mathematical Anxiety significantly differ on Logical Thinking. Only the Rural adolescents do not differ significantly.

6) There is significant inverse relationship between Mathematical Anxiety and Logical Thinking of adolescents. Only Boys do not have significant relationship.

Educational Implications:-

Mathematicians say Math should be a stepping stone to new heights. It should not be a case of learning for the test. Students need to see Math as an exploration where rules are to be understood and mistakes are a step forward to success. Here the scene is just opposite. Math is taught mechanically. Mentors, Parents and teachers always insist that the adolescents should pay more attention to Math. Very much importance is given to Math. They always talk about complexities of math. Adolescents' minds are made to believe that Math is very difficult subject and it is not possible for every one to understand it. This attitude of elders contribute in increasing the Mathematical anxiety. Math should not be taught as a subject but it should be taught to make life easy. It should be imbibed on their young minds that math's knowledge is required in every walk of life. In lower classes it should be taught with other subjects in such a way so that kids will not know that they are learning math..

In the this study the researcher has tried to find out the level of Mathematical anxiety and it has been seen that only 11.8% adolescents have low Mathematical Anxiety and rest others have average and high Mathematical anxiety. It implies a big number of adolescents have anxiety regarding Math. This needs to be taken care. Measures must and should be taken to lessen it. Adolescents need to be taken in confidence to suggest ideas and try them out. They should have very clear idea that understanding the concept and process used to get the solution is important than going for correct answer. If they are taught rules, children struggle. Real mathematicians explore math. Teaching math with innovative ways will create interest, avoid repulsiveness and minimise anxiety. This will encourage the student to go for Math courses for their brighter future and rewarding careers which is the need of the hour. Math based courses assure professional and financial security.

About 42% of the adolescents have low Logical Thinking. The knowledge imparted should be practically implemented. It will improve young learners' Logical Thinking and create interest and confidence. (A child of a vegetable vendor may not be having formal education but is very fast in calculating mentally. Where as an adolescent going to school could not do it without pen and paper). It is because of the practical implementation and developed Logical thinking.

The above research tried to identify the correlation of Mathematical Anxiety and Logical thinking among adolescents. It came out to be inverse and significant except in boys. Hence it can be said that Mathematical Anxiety and Logical Thinking have Inverse significant correlation. It clearly suggests that if Mathematical Anxiety diminishes the level of Logical Thinking improves. When this stage is reached they will become confident and emotionally strong. The adolescents will change their attitude. It will enhance their personality.

The dynamics of existence in the present times has brought back our attention to the essentials of innovation, research and development. Mathematics being the base of these essentials its importance is felt now like never before. Now this is the responsibility of the educators to create such an environment which will change the scenario and take the adolescents to bright future. These adolescents having high level of Logical Thinking anxiety and minimized Mathematical Anxiety will navigate the nation to new heights.

As in this world of competition, it is very important that each and every adolescent should be competent enough to handle the stress and pressure. They should be helped to minimize their stress and pressure so that they can lead their life comfortably.

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