Math anxiety and math achievement in rural minority students

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Abstract
In this research paper the researchers made an attempt to investigate the difference, if any, between male and female students of rural minority community in respect to their math anxiety and math achievement scores. They also tried to find out the correlation between math anxiety and math achievement scores. A sample of 222 (103 male and 119 female students) of rural minority students of class VIII were selected randomly. Analyzing the data collected from sample group, the result shows that there is a significant difference between male and female students in math anxiety and math achievement scores. It was also found that math anxiety and math achievement are significantly and inversely correlated (r = -0.264).

Keywords: Math Anxiety, Math Achievement, Rural Areas, Minority Students

1. Introduction
The term Academic Achievement refers to “some method of expressing a student's scholastic standing. Usually this is a grade for a course, an average for a group of courses in a subject area, or an average for all courses” (Lavin, D. E., 1965). As is well known, the performance of some students exceeds the level that would be predicted from measures of intellectual ability, while the performance of others falls below the predicted level. There are some factors responsible for underachievement at high levels of ability may be different or operate differently from those causing underachievement at medium or low levels of ability. Test taking anxiety, subject centered specific anxiety, low motivation levels, poor mental health, lack of aspiration, study habits, attitudes toward study, ambition and mental abilities etc. are some of the influential factors of academic achievement. The overall academic achievement of the secondary level students depends much on Mathematics. In India, the regional or state boards of secondary education also emphasize the math scores in the overall achievement of all students. But it is a matter of fact that the maximum numbers of secondary students always feel some anxiety in mathematics. Anxiety always serves as a negative force towards
achieving good academic performance. Hence, Math Anxiety also have some relationship with mathematics achievement.

2. Math Anxiety and Math Achievement

Math anxiety is a phenomenon that is often considered when examining students’ problems in mathematics. It causes the feelings of nervous tension, fear of rejection, and stress in students mathematics problem solving as well as their academic life. At the school level, this anxiety is most often seen in mathematics subject. In most cases, mathematics anxiety is not extreme or overwhelming, yet it continues to disturb most students throughout their encounter with mathematics. Rossnan (2006) opined that mathematics anxiety could be developed as a result of a student’s prior negative experiences learning mathematics in the classroom or at home.

Richardson & Suinn (1972) defined mathematics anxiety as the feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a variety of ordinary life and academic situations. Tobias and Weissbrod (1980) viewed mathematics anxiety as the panic, helplessness, paralysis and mental disorganization that arises among some people when they are required to solve a mathematical problem.

Most of the students show numerous syndromes and signs of mathematics anxiety in schools. The students being anxious to mathematics frequently exhibit the avoidance of mathematics and the decline in mathematics achievement. It has been found that mathematics anxiety relates to mathematics performance of learners. Because mathematics anxiety decreases the efficiency of students’ working memory. It is very difficult for students to think logically which results in increased errors and longer processing times when solving problems mentally due to their math anxiety. Hence, it lower academic performance in the subject. In their research, Ho et al. (2000) found that the high mathematics anxious students tend to have lower levels of performance in mathematics. They also documented the existence of a negative correlation between mathematics anxiety and performance. The legendary researcher of the field, Hembree (1990) found that reducing mathematics anxiety is consistent with improving mathematics achievement.

Mathematics achievement referred to mathematics accomplished successfully, specifically by means of exertion, skill or practice. For higher achievement in mathematics students have to think logically and grow up interest in the subject mathematics and practice more. But the students who have high mathematics anxiety, always tries to escape from that circumstance where they have to execute numerical calculation (Ashcraft, 2002). So it can be supposed that there is a negative relationship between mathematics anxiety and mathematics achievement.

3. Objectives of the Study

The researchers conducted their study to achieve the following objectives:

i. To explore the difference between the Math Anxiety Scores of minority male and female students.

ii. To explore the difference between the Math Achievement Scores of minority male and female students and

iii. To find out the relation between Math Anxiety and Math Achievement of minority pupils.

4. Methodology of the Study

4.1 Population and Sample
The population of the study is consisted of all the minority students of class VIII of the Bengali medium secondary school in West Bengal. The researchers selected their sample randomly from the Bengali medium rural schools under WBBSE, West Bengal from Malda district. The sample groups comprised of 103 Boys and 119 Girls from class VIII of four rural schools specially from minority community.

4.2 Tools Used in the Study

i. “Mathematics Anxiety Scale (MAS-MSKT)” – to collect scores in math anxiety from the sample groups the researchers used “Mathematics Anxiety Scale (MAS-MSKT)” developed and standardised by S. Mahmood and T. Khatoon which consists of 14 items for the students of secondary and senior secondary level of education.

ii. “Math Achievement Test” - a criterion test on mathematics syllabus of class VIII under the WBBSE curriculum were developed, standardized and applied by the researchers and scores were collected from the sample groups. The test consists of 20 items.

4.3 Limitations of the Study

For this study the samples were taken only from Malda district of West Bengal. Researchers restricted their study within four schools and numbers of samples were comprised of 222 among which 103 were male and 119 were female students studying in class VIII of Bengali medium schools under WBBSE. The study was further delimited to the rural minority pupils of the district.

5. Hypotheses of the Study

1\(^{H_0}\) : There would be no significant difference between the math anxiety scores of minority male and female students.

2\(^{H_0}\) : There would be no significant difference between the math achievement scores of minority male and female students.

3\(^{H_0}\) : There would be no significant relation between math achievement and math anxiety of the minority students.

6. Analysis and Interpretation of the Study

The researchers used and analysed the collected data for their study through descriptive and inferential statistics. Presentation of the descriptive analysis is as follows:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Descriptive Statistics</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Std. Error</td>
<td>Statistic</td>
</tr>
<tr>
<td>Math Anxiety</td>
<td>Mean</td>
<td>35.3981</td>
<td>.93072</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>36.0000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variance</td>
<td>89.222</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>9.44576</td>
<td></td>
</tr>
<tr>
<td>Math Achievement</td>
<td>Mean</td>
<td>24.3010</td>
<td>.97931</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>24.0000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variance</td>
<td>98.781</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>9.93887</td>
<td></td>
</tr>
</tbody>
</table>
From the table-1, it is shown that the male students were less anxious about mathematics than the female students as their mean score of math anxiety is less than the mean score of female students. On the other hand, the math achievement of male students is higher than the mean score of math achievement of female students. Beside this, it is also evident that the mean scores of male and female students in math anxiety and math achievement are very close to the true mean scores accordingly, as the standard errors for all the groups are not very high. The scores in math anxiety and math achievement of male students are quite more dispersed than the scores obtained by the female students accordingly.

### 6.1 Analysis and Interpretation of Inferential Statistics

$H_0^1$: There would be no significant difference between the math anxiety scores of minority male and female students.

From the table 2, it is seen that the $t$ – value of the Math Anxiety Scores of rural minority male and female students is significant as the $p$-value is lower than 0.01 ($p < 0.01$). Therefore, the first null-hypothesis was rejected which implies that there is a significant difference between the math anxiety scores of male and female students.

$H_0^2$: There would be no significant difference between the math achievement scores of minority male and female students.

From the table 3, it is seen that the $t$ – value of the Math Achievement Scores of rural minority male and female students is significant as the $p$-value is lower than 0.01 ($p < 0.01$). Therefore, the first null-hypothesis was rejected which implies that there is a significant difference between the math achievement scores of male and female students.
The table 3 shows that the p-value is lower than 0.01 (p < 0.01) and the t-value of the math achievement scores of rural minority male and female students is significant. Therefore, the second null-hypothesis was rejected which implies that there is a significant difference between the math achievement scores of male and female students.

\[ H_0 : \] There would be no significant relation between math achievement and math anxiety of the minority students.

Table 4. Correlation between math anxiety and math achievement of rural minority students

<table>
<thead>
<tr>
<th>Math Anxiety</th>
<th>Math Anxiety</th>
<th>Math Achievement</th>
<th>Math Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-.264**</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>222</td>
<td>222</td>
</tr>
<tr>
<td>N</td>
<td>222</td>
<td>222</td>
<td>222</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

The correlation between math anxiety and math achievement of rural minority students is −0.264, as shown in the table 4, which indicates that the math anxiety and math achievement is inversely correlated. The Pearson correlation is significant as p-value lower than 0.01 level (2-tailed). So statistically it can be conclude that there is a significant correlation between math achievement and math anxiety of the minority students.

7. Suggestion for further study

The researchers conducted the study on the rural minority population of students (VIII-Grade) in Malda district of West Bengal. In future the study could be broadened in terms of the research locality, size of research sample and method and design of the study.

8. Conclusions

Math anxiety is a debilitating factor of achievement, especially of math achievement. It reduces the efforts and motivation to acquire skill in mathematics. The present study also depicted and proved that math anxiety and math achievement has a negative correlation, which indicates that the students with heightened math anxiety show a poor performance in mathematics. Therefore, the teachers should follow and use such methodologies in teaching mathematics that will help the students to be interested in mathematical operations.

9 References


