Achievement In Mathematics Of Ninth Class Government School Students In Relation To Their Attitude Towards Mathematics

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Abstract
This study examines the achievement in mathematics of ninth class government school students in relation to their attitude towards mathematics. The findings were based on the responses of 453 government school adolescents (223 males and 230 females) selected from ten government schools of Chandigarh. Mathematics Achievement test and Attitude towards Mathematics scale developed and standardized by the investigator were used for data collection. Results show that achievement in mathematics of adolescents studying in government schools has significant and positive correlation with different dimensions of attitude towards mathematics, i.e. self-confidence, motivation, usefulness, teacher’s expectations and enjoyment as well as total attitude towards. The study concluded that there is significant difference in achievement in mathematics of ninth class government school students in relation to their attitude towards mathematics.

1. INTRODUCTION
No other subject has larger application than mathematics. It is the most significant instrument for understanding and exploring our scientific, economic and social world (Awoniyi, 2013). In every field of human endeavour the importance of mathematics cannot be underestimated (Tella, 2008). Because of the wide importance of mathematics and the way in which it is advancing at an amazing rate, it has a persistent influence on our everyday lives and contributes to the wealth of the country. Mathematics is the very base of human civilization. From wonders of the Taj Mahal, Egyptian Pyramids and
Learning Tower of Pisa to the making of atomic bomb and spacecraft’s each of these can be unraveled using mathematics. In fact everything we do in our life is governed by mathematics. Mathematics is one of the cornerstones of our civilization. From Euclidean 3-D geometry it is a forward march to the non-Euclidean and to new Mathematics. Right from time immemorial the structure of mathematics has fascinated mathematicians and scientists. Man is closely associated with this subject because he has reason and thinks for his survival. The three arms of science i.e. thinking, reasoning and experience are the common aspects of this subject and the life of people (Geetha, 1999). One of the outstanding characteristics of scientific culture is quantification. Mathematics therefore assumes a prominent position in modern education. The advent of automation and cybernetics, in this century, marks the beginning of the scientific and industrial revolution and makes it all the more imperative to devote special attention to the study of mathematics. Proper foundation in the knowledge of the subject should be laid at school (Kothari Commission, 1964-1966).

Students experience both positive and negative emotions while learning mathematics and these emotions influence the development of their attitude towards mathematics as a whole. Four affective issues often arise when learning mathematics: the role of the teacher; support and influence of the family; challenge and issues of fear of failure, and avoidance (Sliva & Roddick, 2001). All four of these issues have great potential to influence a student’s attitude towards mathematics. It follows therefore, that in order to have better students’ performance in mathematics, there is need to motivate them to have positive attitude towards the subject. According to Keil (1988), attitudes are positive or negative feelings that an individual holds about objects, persons or ideas. They are generally regarded as enduring though modifiable by experience, and / or persuasions and as learned rather than innate. Zimbardo and Leippe (1991) define attitude as favorable or unfavorable evaluative reasons whether exhibited in beliefs, feelings, or inclinations to act towards something. According to them, attitude is commonly referred to as beliefs and feelings related to a person or event and their resulting behavior. This means that when individuals have to respond quickly to something, the feeling can guide the way they react.

1.1 Attitude towards Mathematics

Students develop positive attitude toward mathematics when they are taught good mathematics in a supportive and enabling environment. Students’ accomplishment in mathematics depends upon their attitude towards mathematics. Attitude towards mathematics plays a great role in mathematical achievement of the students. Attitudes operate in a specific behavior pattern and are connected closely with emotional reactions. According to Odufuye (1985), the attitude of an individual towards mathematics is the measure of the individual’s attractiveness or repulsiveness to mathematics. This invariably influences his/her choice and even, achievement in mathematics.

Attitude is the positive or negative extent of influence associated with a certain
subject. Thus, attitude toward mathematics is just a positive or negative emotional disposition toward mathematics (McLeod, 1992; Haladyna, Shaughnessy & Shaughnessy, 1983).

Attitude towards mathematics plays a vital role in the teaching and learning process. It affects students’ achievement in mathematics (Farooq & Shah, 2008). Hariharan (1992) investigated the attitudes of high school students towards homework and their achievement in mathematics and found that the students with positive attitude have better academic achievement in mathematics. Mohamed and Waheed (2011) found that students’ attitude towards mathematics has been a factor that is known to influence students’ achievement in mathematics. However, no gender differences in their attitudes were reported. Yara (2009) studied students’ attitude towards mathematics and academic achievement in some selected secondary schools in south-western Nigeria. The results showed that the students’ attitude towards mathematics was positive and that many of them believed that mathematics is a worthwhile and necessary subject which can help them in their future career.

Michelli (2013) examined the correlation between attitudes toward and achievement in mathematics among fifth grade students. Results show a positive correlation between attitude and achievement in mathematics among the fifth grade participants. Else-Quest, Mineo, and Higgins (2013) conducted a study on math and science attitudes and achievement at the intersection of gender and ethnicity. Male and female adolescents earned similar end-of-year grades in math and science, whereas Asian American students outperformed students from the other ethnic groups in math and science. Attitudes were strong predictors of achievement.

2. OBJECTIVES OF THE STUDY
I. To find out the relationship of achievement in mathematics of ninth class government school adolescents with their attitude towards mathematics.
II. To study achievement in mathematics of ninth class government school adolescents in relation to their attitude towards mathematics.

3. HYPOTHESES FORMULATED
I. There exists significant positive relationship of achievement in mathematics with attitude towards mathematics of ninth class adolescents studying in government schools.
II. There exists significant difference in achievement in mathematics of ninth class government school adolescents in relation to their attitude towards mathematics.

4. DESIGN OF STUDY
A systematic procedure to collect data, which helps to test hypotheses of the study under investigation, was adopted. The method was essentially descriptive survey method.
Sample:
In the present study, 453 government school adolescents (223 males and 230 females) selected from ten government schools of Chandigarh. The ninth class students were taken. Two-stage random sampling technique was employed.

Tools Used
The following tools were used to collect data:
  i.) Attitude towards Mathematics Scale developed by the investigator.
  ii.) Mathematics Achievement test developed by the investigator.

Statistical techniques
To analyze the data statistically Mean, Standard Deviation, t-ratio and coefficient of correlation were computed the results were interpreted accordingly.

5. RESULTS & ANALYSIS

Table 1: Correlation of Achievement in Mathematics with Different Dimensions of Attitude towards Mathematics of Ninth Class Adolescents Studying in Government Schools (N=453)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Achievement in Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude towards Mathematics</td>
<td></td>
</tr>
<tr>
<td>Self –confidence</td>
<td>0.368**</td>
</tr>
<tr>
<td>Motivation</td>
<td>0.314**</td>
</tr>
<tr>
<td>Usefulness</td>
<td>0.226**</td>
</tr>
<tr>
<td>Teacher’s expectations</td>
<td>0.223**</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>0.222**</td>
</tr>
<tr>
<td>Attitude towards mathematics( total)</td>
<td>0.345**</td>
</tr>
</tbody>
</table>

** Significant at 0.01 level  * Significant at 0.05 level

Results entered in Table 1 show that achievement in mathematics of adolescents studying in government schools has significant and positive correlation with different dimensions of attitude towards mathematics, i.e. self-confidence, motivation, usefulness, teacher’s expectations and enjoyment as well as total attitude towards mathematics. The significant and positive correlation of self-confidence dimension of attitude towards mathematics with achievement in mathematics indicates that the higher the self confidence among adolescents studying in government schools is, the higher is their mathematics achievement and vice versa. This implies that adolescents who have firm trust in their performance in mathematics, and have confidence to ask questions in mathematics class, score higher in mathematics.

A positive and significant correlation of achievement in mathematics of adolescents studying in government schools with motivation dimension of attitude towards mathematics implies that adolescents, who have a keen desire to pursue mathematics at higher level, score high in mathematics. Also, there is a positive and significant correlation between usefulness dimension of attitude towards mathematics and mathematics achievement of adolescents studying in government schools. This
suggests that adolescents scoring high in usefulness dimension of attitude towards mathematics also score high in mathematics. This implies that those adolescents who value the usefulness and worth of mathematics in their life and in the future score higher in mathematics. A positive and significant correlation between teacher’s expectations dimension of attitude towards mathematics and mathematics achievement of adolescents studying in government schools indicates that adolescents who believe that their teachers have faith in their ability and performance in mathematics, have high achievement in mathematics.

Results entered in Table 1 further show a positive and significant correlation between enjoyment dimension of attitude towards mathematics and mathematics achievement of adolescents studying in government schools. It indicates that adolescents who like mathematics and love to attend mathematics classes, score high in mathematics. A positive and significant relationship between total attitude towards mathematics and mathematics achievement indicates that the higher the self-confidence, motivation, usefulness, and enjoyment among government school adolescents, the higher is their achievement in mathematics. Hence, attitude towards mathematics plays a major role in their achievement in mathematics. Thus, the Hypothesis 1, namely, “There exists significant positive relationship of achievement in mathematics with attitude towards mathematics of ninth class adolescents studying in government schools,” has been accepted to a great extent.

Table 2: Mean Differentials in Achievement in Mathematics of Ninth Class Government School Adolescents with Low and High Scores in Different Dimensions of Attitude towards Mathematics

<table>
<thead>
<tr>
<th>Dimensions of Attitude towards Mathematics</th>
<th>Mean (Low) (N=122)</th>
<th>Mean (High) (N=122)</th>
<th>SD (Low)</th>
<th>SD (High)</th>
<th>t-value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-confidence</td>
<td>27.72</td>
<td>37.48</td>
<td>11.25</td>
<td>8.89</td>
<td>7.51</td>
<td>0.01</td>
</tr>
<tr>
<td>Motivation</td>
<td>27.91</td>
<td>36.62</td>
<td>10.70</td>
<td>10.30</td>
<td>6.47</td>
<td>0.01</td>
</tr>
<tr>
<td>Usefulness</td>
<td>28.51</td>
<td>36.80</td>
<td>10.85</td>
<td>9.82</td>
<td>6.25</td>
<td>0.01</td>
</tr>
<tr>
<td>Teacher’s expectations</td>
<td>29.05</td>
<td>35.31</td>
<td>11.63</td>
<td>9.78</td>
<td>4.55</td>
<td>0.01</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>30.20</td>
<td>36.55</td>
<td>11.39</td>
<td>9.65</td>
<td>4.69</td>
<td>0.01</td>
</tr>
<tr>
<td>Attitude towards mathematics( total)</td>
<td>28.07</td>
<td>37.75</td>
<td>10.97</td>
<td>8.81</td>
<td>7.57</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Entries made in Table 2 show that all the mean differentials calculated between the mean scores of achievement in mathematics of government school adolescents with low and high scores in different dimensions of attitude towards mathematics, i.e. Self-confidence, motivation, usefulness, teacher’s expectations, enjoyment and attitude towards mathematics (total) were significant at .01 level of significance.
The mean score of achievement in mathematics of adolescents with high scores in self-confidence dimension of attitude towards mathematics is higher than the mean score of adolescents with low scores in this dimension of attitude towards mathematics. This suggests that achievement in mathematics of the adolescents, who are more confident to ask questions in mathematics class, and handle more difficult mathematics problems independently is better than their counterparts who are less confident in mathematics class.

Results further show that the mean score of achievement in mathematics of government school adolescents with high scores in motivation dimension of attitude towards mathematics is higher than the mean score of adolescents with low scores in this dimension. This suggests that adolescents who put more efforts and have a keen desire to pursue mathematics at higher stage, score higher in mathematics than their counterparts who put less efforts and who lack keen desire to pursue mathematics at higher stage. Further, the mean score of achievement in mathematics of government school adolescents with high score in useful dimension of attitude towards mathematics is higher than the mean scores of adolescents with low scores in usefulness dimension of attitude towards mathematics. This suggests that achievement in mathematics of those adolescents who give more value to usefulness and worth of mathematics in their life is better as compared to their counterparts.

The mean score of achievement in mathematics of government school adolescents with high scores in teacher’s expectation dimension of attitude towards mathematics is higher than the mean score of adolescents with low scores in this dimension. This suggests that achievement in mathematics of those adolescents who have more firm beliefs that their teachers have faith on their ability and performance in mathematics is better than their counterparts who perceive that their teachers don’t have much faith in their ability and performance. Higher mean score of achievement in mathematics of government school adolescents with high scores in enjoyment dimension of attitude towards mathematics than the mean score of adolescents with low score in this dimension indicates that achievement in mathematics of those adolescents, who enjoy mathematics learning and problem solving more, is better than those who enjoy learning of mathematics less.

In addition, the mean score of achievement in mathematics of adolescents with high scores in total attitude towards mathematics is higher than the mean score of adolescents with low scores in total attitude towards mathematics. This implies that achievement in mathematics of the adolescents who have more positive attitude towards mathematics is better than their counterparts with less positive attitude towards mathematics. On the basis of above discussion of results, it can be concluded that achievement in mathematics of those government school adolescents, who are more confident in solving mathematics problems are highly motivated to pursue studies in mathematics, value the usefulness and worth of mathematics in their life now and in the future more, have more firm beliefs that their teachers have faith on their ability and
performance in mathematics and enjoy more while solving mathematics problems, is better as compared to with low scores on these dimensions. This suggests that achievement in mathematics of government school adolescents with high and low scores in attitude towards mathematics differ significantly i.e. the more positive is attitude towards mathematics, the higher is the achievement in mathematics. Hence, Hypothesis 2, namely, “There exists significant difference in achievement in mathematics of ninth class government school adolescents in relation to their attitude towards mathematics” has been accepted. The present finding confirms the results by Else-Quest, Mineo, and Higgins (2013); Hariharan (1992) and Yara (2009) who have found that the students with positive attitude have better academic achievement in mathematics.

Attitude towards mathematics was found to be an important predictor in this study. Efforts should be made to develop and gauge the positive attitude towards mathematics. Therefore teachers should arrange such activities in the classroom which may make the adolescents self-confident in handling mathematical problems and motivate them for learning mathematics. Stakeholders should organize periodic seminars and workshops for students, parents and teachers designed to promote positive attitudes towards mathematics. These programs should begin at the primary level and continue throughout the school career, producing positive results in the long run.

6. REFERENCES


**ABOUT THE AUTHOR**

Dr. Kiranjit Kaur did M.Sc. (Mathematics), M.Ed. and Ph.D. (Education) from Panjab University, Chandigarh. She has cleared U.G.C (N.E.T) in Education. Presently, she has been working as Assistant Professor in Education (Teaching of Mathematics), at Dev Samaj College of Education Sector 36-B, Chandigarh. She has 13 years of teaching experience in Teaching of Mathematics at B.Ed. level and 9 years of teaching experience in Guidance and Counselling at M.Ed. level. She has guided more than 22 M.Ed. students for Dissertations. She has been contributing research papers to various National and International Journals. Till date 19 research papers has been published. She has presented papers at various National and International conferences, Seminars, attended Workshops, and delivered lectures to in service teachers. Her areas of interest are Mathematics, Mathematics Education, Guidance and Counselling, Teacher Education, Philosophical and Sociological foundations of Education, Educational Psychology and Measurement and Evaluation.