Attitude Towards Mathematics And Achievement In Mathematics Of Students At Secondary Level During Covid 19 Pandemic

Sindhu S [1*]

[1*] *NSS Training College , Changanassery, Changanacherry, Kottayam, Kerala*

***Corresponding Author:** Sindhu S*
* *NSS Training College , Changanassery, Changanacherry, Kottayam, Kerala*

Abstract

The purpose of the study was to explore student's attitude towards mathematics and their achievement in mathematics during Covid 19 Pandemic. Attitude scale was used to find out the attitude towards mathematics and achievement test was used to measure the achievement of students in mathematics. A sample of 185 secondary school students was selected from various schools of Kottayam district. The sample consisted of 90 boys and 95 girls. The result indicated a significant positive correlation between attitude towards mathematics and achievement in mathematics among secondary school students during Covid 19 Pandemic. The study revealed that attitude towards mathematics of girls are higher and girls are having greater achievement than boys.

Keywords:. Attitude towards Mathematics, Achievement in Mathematics

1. Introduction

Mathematics is a powerful tool for global understanding and communication that organizes our lives and prevents chaos. Mathematics helps us understand the world and provides an effective way of building mental discipline. Mathematics encourages logical reasoning, critical thinking, creative thinking, abstract or spatial thinking, problem-solving ability, and even effective communication skills. Mathematics plays a vital role in all aspects of life, whether in everyday matters such as time tracking, driving, cooking, or jobs such as accounting, finance, banking, engineering, and software. These functions require a strong mathematical background, and scientific experiments by scientists need mathematical techniques. They are a language to describe scientists' work and achievements.

Mathematics is the pillar of organized life for the present day. Without numbers and mathematical evidence, we cannot resolve any issues in our daily lives. There are times, measurements, rates, wages, tenders, discounts, claims, supplies, jobs, stocks, contracts, taxes, money exchange, consumption, etc., and in the absence of these sports data, we have to face confusion and chaos.

Thus, mathematics has become the companion of man and his helper since the beginning of human existence on earth. When man first wanted to answer questions such as "How many?" he invented math. Then algebra was invented to facilitate calculations, measurements, analysis, and engineering. As for mathematical inventions, they are numerous throughout the ages. Some of them were tangible, such as counting and measuring devices. Some of them are not as tangible as methods of thinking and solving. The symbols that express numbers are also one of the most important mathematical inventions.

Mathematics helps in analytical thinking. While solving maths problems, data are collected, disassembled, and then interconnected to solve them.

- Mathematics helps to develop the ability to think.
- It helps explain how things work.
- It helps to develop wisdom.
- It increases the speed of intuition.
- It helps to make the child smarter.
- Money can be collected in mathematics when used as a profession.
- It is important in a constantly evolving world.
- It provides the child with an opportunity to get to the world.

2. Need and Significance of the Study

Covid-19 pandemic has brought glaring changes across several sectors. Education is one of them. With the pandemic of COVID- 19 and subsequent lockdown, there was a sudden shift away from the classroom. The inaccessibility to physical classrooms accelerated a new digital educational pedagogy. The pandemic caused educational institutions, teachers, parents and students to explore other digital options and platforms beyond traditional schooling. The digital platforms require computer usage and technological advancements as pre requisite. Liaw & Huang (2011) have shown that a student's skill in technology is significant. COVID-19 pandemic has adversely impacted the educational learning platform and resulted in a challenging situation for both teachers and students throughout the world. Despite the pandemic disruption, the educational system must continue to operate in the form of online classes and e-learning modules (Kanneganti et al., 2020; Talimodao & Madrigal, 2021). Elfirdoussi et al. (2020) stated that schools have been shut down and shifted to online learning, which is not interesting to the side of students compared to face-to-face learning due to some challenges. In that case, several adverse scenarios are encountered in the teaching-learning process (Dubey & Pandey, 2020; Kanneganti et al., 2020; Onyema et al., 2020). One of the courses that students highly avoid in higher education is mathematics due to its complexity and abstract difficulty (Casinillo, 2019). According to Ní Fhloinn and Fitzmaurice (2021), several challenges are experienced by mathematics teachers and learners, such as limitations in communication, internet concerns, and difficulty in presenting mathematical symbols and equations, among other problems. Hence, several studies in literature deal with the challenges in mathematics education to understand and contribute some policy that is fit for pandemic and beyond (Bakker & Wagner, 2020; Carius, 2020; Mahmut, 2020; Wahyuningrum & Latifah, 2020; Francom et al., 2021).

It is worthy to note that mathematics requires doing with the luxury of time and attention of teachers. However, due to barriers like health protocols, financial problems, and low internet connectivity, among other problems, the level of challenge in learning mathematics is higher than it used to be. This study focuses on the extend of attitudes of students towards mathematics and their achievement in mathematics.

3. Definition of Key Terms

ATTITUDE TOWARDS MATHEMATICS:
Attitude towards mathematics (ATM) is the student's organized predisposition to think, feel, perceive, and behave toward mathematics (Jovanovic and King 1998); ATM is an aggregated measure of "a liking or disliking of mathematics, a tendency to engage in or avoid mathematical activities, a belief that one is good or bad at mathematics, and a belief that mathematics is useful or useless" (Neale 1969, p. 632); ATM Scale measures an individual's feelings, interests, and predispositions toward mathematics (Askar 1986).

ACHIEVEMENT IN MATHEMATICS:
Mathematical Achievement is the competency shown by the student in the subject mathematics. Its measure is the score on an achievement test in mathematics.

4. Objectives of the Study

The objectives of the present study are:
1. To find out the extent of attitude towards mathematics among secondary school students during Covid 19 Pandemic
2. To find out the achievement of mathematics among secondary school students during Covid 19 Pandemic

3. To compare the attitude towards mathematics of boys and girls of secondary school level during Covid 19 Pandemic
4. To compare the achievement of boys and girls of secondary school level during Covid 19 Pandemic
5. To find out the relationship between attitude towards mathematics and achievement of mathematics of secondary school students for the total sample and subsample during Covid 19 Pandemic

5. Hypotheses of the Study

1. The attitude towards mathematics among secondary school students will be low during Covid 19 Pandemic
2. The achievement of mathematics of secondary school students will be low during Covid 19 Pandemic
3. There will be significant difference in the attitude towards mathematics of secondary school students for the sub sample gender during Covid 19 Pandemic
4. There will be significant difference in the achievement of mathematics of secondary school students for the sub sample gender during Covid 19 Pandemic
5. There is significant positive relationship between attitude towards mathematics and mathematics achievement among secondary school students during Covid 19 Pandemic
6. There is significant positive relationship between attitude towards mathematics and achievement in mathematics among secondary school students during Covid 19 Pandemic based on the sub sample Gender –

a) Boys
b) Girls

6. Methodology

Attitude towards mathematics was found out using survey method. Achievement in mathematics of students was measured using achievement test. The sample comprised of 185 secondary school students. An attitude scale was constructed and standardized by the investigator were used to collect attitude towards mathematics of secondary school students. The scale consisted of a total of 40 questions. The correlation between attitude towards mathematics and achievement in mathematics was identified using Pearson's Product Moment Coefficient of Correlation and the test of significance of correlation was found using Fischer's Test.

6. Analysis and Interpretation of Data

Table 1 Nature of scores of Attitude towards Mathematics among Secondary School students for the total sample and relevant sub sample based on Gender during Covid 19 Pandemic

Sample	Number of students	Mean	Median	SD	Skewness	Kurtosis
Total	185	76.98	76	8.67	0.45	0.27
Boys	90	76.78	75	8.28	0.48	0.32
Girls	95	79.52	78	8.71	0.56	0.72

Analysis of table 1 indicates a mean value of 76.98 which is an appreciable mean score with a standard deviation of 8.67. The value of skewness is 0.45 which indicates a positively skewed graph. The kurtosis obtained is 0.27 which indicates that the distribution is platykurtic in nature.

The boys scored a mean of 76.78 with a standard deviation of 8.28. The value of skewness is 0.48 which indicates a positively skewed graph. The value of kurtosis is 0.32 indicating a platykurtic distribution.

The results from table also indicate that the mean score of girls of secondary school level for attitude towards mathematics is 79.52 which is an appreciable score. The standard deviation for the group is 8.71. The value of skewness is 0.56 which indicates a positively skewed graph. The value of kurtosis is 0.72 indicating the distribution to be platykurtic in nature

Table 2 Nature of scores of Achievement in Mathematics of Secondary School Students for the total sample and subsample based on Gender during Covid 19 Pandemic

Sample	Number of students	Mean	Median	SD	Skewness	Kurtosis
Total	185	74.18	73	6.13	0.41	0.18
Boys	90	73.26	72	7.77	0.86	0.97
Girls	95	76.19	77	7.50	0.54	0.61

Analysis of table 2 indicates a mean value of 74.18 with a standard deviation of 6.13. The value of skewness is 0.41 which indicates a positively skewed graph. The kurtosis obtained is 0.18 indicates the distribution is platykurtic in nature.

The result for the boys of secondary school level indicates a mean of 73.26 with a standard deviation of 7.77. The value of skewness is 0.86 which indicates a positively skewed graph. The value of kurtosis is 0.97 indicating that the distribution is leptokurtic.

The result also indicates that the mean score of achievement in mathematics for girls of secondary school level is 76.19.The standard deviation for the group is 7.50. The value of skewness is 0.54 which indicates a positively skewed graph. The value of kurtosis is 0.61 indicating the distribution is platykurtic in nature.

Table 3 *Data and result of test of significance of difference between mean scores of Attitude towards Mathematics among Secondary School Students based on gender during Covid 19 Pandemic*

Subsample	Number	Mean	SD	Critical ratio
Boys	90	76.78	8.28	
Girls	95	79.52	8.71	2.19**

** p > 0.05

Table 3 shows a critical ratio of 2.19 (C.R=2.19, p>0.05). This value is greater than the value required for significance at 0.05 level, clearly indicating a significant difference between the means of scores of two groups. Since the mean score of girls (M= 79.52) is higher than that of boys (M= 76.78), the girls are having greater attitude towards mathematics than boys.

Table 4 *Data and result of test of significance of difference between mean scores of Achievement in Mathematics among Secondary School Students based on gender during Covid 19 Pandemic*

Subsample	Number	Mean	SD	Critical ratio
Boys	90	73.26	7.77	
Girls	95	76.19	7.50	2.62**

** p > 0.05

Table 4 shows a critical ratio of 2.62 (C.R=2.62, p>0.05). The value is significant at 0.05 level, clearly indicating a significant difference between the means of scores. Since the mean score of girls (M=76.19) is higher than that of boys (M=73.26), the girls are having greater achievement in mathematics than boys

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Table 5 *Correlation between Attitude towards Mathematics and Achievement in Mathematics of Secondary School Students during Covid 19 Pandemic*

N	r	Fisher's 't'	Confidence interval
185	0.689	12.86**	(0.58 , 0.78)

**r significant at 0.01 level

The interpretation of table 5 indicates the following results:
The value of Pearson's coefficient of correlation 'r' between the attitude towards Mathematics and Achievement in Mathematics of secondary school students for the total sample is 0.689. This indicates a positive relationship between the two variables.
The Fisher's 't' value obtained for the 'r' is 12.86 (t=12.86, p< 0.01). Since the 't' value is greater than the required value, it can be inferred that the relationship between attitude towards Mathematics and achievement in Mathematics is significant at 0.01 level of significance.
The confidence interval of 'r' at 0.99 level is (0.58 , 0.78) suggests that the population 'r' lies between 0.58 and 0.78, the probability of this being 99%.

Table 6 *Correlation between Attitude towards Mathematics and Achievement in Mathematics of Secondary School Students for the subsample based on Gender during Covid 19 Pandemic*

Subsample	N	r	Fisher's 't'	Confidence interval
Boys	90	0.721	9.75**	(0.58, 0.82)
Girls	95	0.768	11.57**	(0.66 , 0.84)

**r significant at 0.01 level

The value of Pearson's coefficient of correlation 'r' between the attitude towards Mathematics and Achievement in Mathematics for Boys of secondary school level is 0.721. This indicates a positive relationship between the two variables. The Fisher's 't' value obtained for the 'r' is 9.75 (t=9.75, p< 0.01). Since the 't' value is greater than the required value, it can be inferred that the relationship between Attitude towards Mathematics and Achievement in Mathematics is significant at 0.01 level of significance. The confidence interval of 'r' at 0.99 level is (0.58 , 0.82) suggests that the population 'r' lies between 0.58 and 0.82, the probability of this being 99%.

The value of Pearson's coefficient of correlation 'r' between the attitude towards Mathematics and Achievement in Mathematics for Girls of higher secondary school level is 0.. This indicates a positive relationship between the two variables. The Fisher's 't' value obtained for the 'r' is 11.57 (t=11.57, p< 0.01). Since the 't' value is greater than the required value, it can be inferred that the relationship between Attitude towards Mathematics and Achievement in Mathematics is significant at 0.01 level of significance. The confidence interval of 'r' at 0.99 level is (0.66, 0.84) suggests that the population 'r' lies between 0.66 and 0.84, the probability of this being 99%.

7. Discussion of the Result

The study aimed to find a better understanding of attitudes towards mathematics and achievement in mathematics of secondary school students. The study also aimed to examine gender difference in attitude towards mathematics and achievement in mathematics. Data collected from 185 students were analyzed using different statistical techniques. The analysis of sample indicates the following results.

The study found significant difference in the attitude towards mathematics of boys and girls of secondary school level. The boys had a mean score of 76.78 and girls had a mean score of 79.52. The result of test of significance indicates girls having higher attitude towards mathematics than boys. This result is in accordance with the findings of other similar studies (Chowdhury, S. R. ; 2016).

The analysis of data for achievement in mathematics indicates a significant difference in the achievement of boys and girls at secondary school level. The girls have significantly greater achievement than boys indicating girls are more interested in learning mathematics than boys. This result is in accordance with the findings of similar studies (Ajai, J.T. & Imoko, I.I. 2015; Perie, M., Moran, R., & Lutkus, A.D. 2005; Asante, K.O. 2010; Ahmed & Bora 2011).

A comparison of attitude towards mathematics and achievement in mathematics shows a positive correlation between both. Higher attitude towards mathematics is positively correlated to greater achievement. The analysis also indicates a positive correlation between attitude towards mathematics and achievement for both boys and girls of secondary school level. This result is in consistent with similar studies (Dowker et al., 2019; Kiwanuka et al., 2020)

8. Educational Implications

The result of the study infers a positive correlation between Attitude towards mathematics and Achievement in Mathematics. This indicates that a positive attitude towards mathematics is essential in learner for good achievement in mathematics.

Since online learning is a new trend in education during this COVID-19 pandemic, it is essential for students to apply a conscious effort to familiarise and understand new technologies and application which enable them to apprehend subject matter.

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