

Learning Styles as A Correlate of Attitude Towards Mathematics: Study on Senior Secondary Schools

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Abstract

Several studies address the attitude of students towards school academics. The present study is focused on attitude of senior-secondary students towards core subject as Mathematics. Further, the male and female students were analyzed for learning style differences. A descriptive study was employed where a survey method used to collect data of subjects. A total of 497 students were selected as sample from government senior-secondary schools in Kumaon region of Uttarakhand. Mathematics Attitude developed and standardized by Dr. Ali Imam and Dr. Tahira Khatoon and learning styles inventory by Karuna Shankar Misra were administered. The data was put into mean, SD, t-test and correlation analysis statistical measures to draw out results as per the set objectives. Difference was revealed in both attitude towards Mathematics and learning styles variables wherein female students were seen to have higher mean. Also, an additional analysis on correlation between attitude of students and their learning styles highlight a positive, albeit moderate correlation between students' attitude and their learning styles.

Keywords: Attitude, Learning styles, Kumaon region, Senior-secondary, moderate correlation.

Introduction

Mathematics has always been central to our school curriculum. Moreover, the secondary level of education occupies an important place in the school structure. The learnings at these levels are carried along throughout the life. The subject choices decide the future plans and offerings in the higher education as well as in the world of occupation. By the time, students know their interests, have clue about the hardships they feel regarding subjects and the scope. A careful choice between the often-conflicting depth versus breadth needs to be made at this stage. All these guides them to choose wise from future perspective. Attitude towards a subject play an eminent role in this. Attitude can be defined as an enduring system of three components centering about a single object- the cognitive component, the effect connected with the objects- the feeling component and the disposition to take action with respect to the object- the action tendency component (Kretch, Crutchfield & Ballachey). Attitude towards mathematics is a mathematical approach in which individual shows his readiness to respond by associating ideas and making decisions and assessments while solving problems. It is an internal state which effects an individual choice of action towards mathematical objects or events. Attitude towards mathematics is directly related to the liking of the individual to mathematics, to the fear of mathematics, to getting pleasure from it, to value it, to know its importance, National curriculum framework (2005) has also highlighted the role of positive attitude in

Mathematics and advised to make learner's attitude favorable by making teaching, activity based. NCERT proposes objective to develop positive attitude towards mathematics at the primary stage. Empirical observation reveals a negative disposition for mathematics regarding its nature, complexities and mental competency needed to deal with it. The attitude so formed impact the academics as well. Attitude formation takes place critically at adolescence (12-21yrs) which are frozen or crystallized during young adulthood (21-30 yrs). During adolescence, peer influence, media and education influence the formation of attitude. The dispositions are also reflected in academics too. Apart from attitude, individuals have their own way of learning. Few find one way to learn more comfortable other may not be go well on it. The researchers have found that the academic performance of students is related to their learning styles. Over the past decade, learning style preferences of students' and factors affecting their learning styles have been the subject of numerous publications, published either in journals or in conference proceedings.

Learning styles can be said as a set of factors, behaviors and attitudes that facilitate learning. Every learner has distinct preferred ways of perceptions, organization and retention that are consistent. Evidences are also available that show different hemispheres of brain process and perceive differently. The differences in styles of learning can also result in attitude formation. A good learning style may incorporate for resulting a favorable attitude. And consequently, enhance the academic affairs of students. Also, knowing the learning styles relation with attitude of students, necessary educational interventions can be adopted by teachers and stakeholders. Gardner's research has shown that cognitive abilities of humans are pluralistic rather than unitary and the learners of any subject will make progress if given opportunities to use their areas of strength to master the necessary material.

Khaiwal and Gupta (2025) explored gender-based differences and relation between attitudes towards mathematics and academic achievement. No differences were addressed in terms of gender. Otero and Generalao (2025) studied students' learning style preference and Attitudes towards Mathematics among education students. A strong positive relationship was reported. Mahapatra and Sahoo (2022) studied students' attitude towards Mathematics. Females reported better attitude than male. Thapa and Paudel (2020) studied secondary school students' attitude towards Mathematics, no gender variation is seen in terms of attitude.

Objectives of the study

- To study the Attitude towards Mathematics of senior-secondary students.
- To study the learning styles among Mathematics students of senior- secondary level.
- To identify the relation between Attitude towards Mathematics and Learning styles.

Hypotheses

1. There will be no significant difference between attitude scores of male and female students.
2. There will be no significant difference between Learning styles of male and female students.
3. There will be no significant relation between Attitude towards Mathematics and Learning styles.

Methodology

Research method- A descriptive method was used where survey type study was conducted to know the prevailed attitude and the learning styles accommodated by the students.

Sample- The selection of sample was performed randomly so as to ensure generalizability, thereby selecting about 497 subjects from various senior- secondary schools of government administration.

Tool used in study

A scale of Mathematics Attitude developed and standardized by Dr. Ali Imam and Dr. Tahira Khatoon was employed. For learning styles, an inventory by Karuna Shankar Misra was used where it was measured over Reproducing and constructive type of learning styles.

Statistical Techniques

Set of descriptive statistics was used to know the level of attitude among students towards Mathematics. For unboxing the relation between Attitude towards Mathematics and Learning styles, correlation coefficient was found appropriate to use.

Analysis and Interpretation

Objective 1: To study the Attitude towards Mathematics of senior-secondary students

The table 1 provides descriptive statistics for two groups. There were 314 male participants with an average attitude score of 85.17 and standard deviation 10.09. 176 female participants with an average attitude score of 92.17 and a standard deviation of 8.86. in initial observation females appear to have higher mean score than males. The results were further taken to t-test to determine if this difference is statistically significant.

Table 1: Table showing mean scores of Mathematics Attitude scores
Group Statistics

	Group	N	Mean	Std. Deviation-	S.E. Mean
Mathematics attitude scores	M	314	85.17	10.09	.57
	F	176	92.17	8.86	.67

Table 2 interprets result in two steps, Levene’s test and t-test for equality of means. Test for equality of variance can be interpreted from p-value (0.484) which is greater than standard significance level. This implies the assumption of equality of variances is met. The p-value (<0.001) is much smaller indicating statistically significant difference between the mean mathematics attitude scores of males and females.

Table 2: Table showing t-test of Mathematics Attitude scores
Independent Samples Test

		Levene's Test for Equality of Variances		T-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mathematics attitude scores	Equal variances assumed	.48	.491	-7.69	488.00	.000	-7.00	.91	-8.79	-5.21
	Equal variances not assumed			-7.98	402.88	.000	-7.00	.88	-8.72	-5.27

Objective 2: To study the learning styles among Mathematics students of senior- secondary level Table 3 displays the descriptive statistics for genders, based on measured variable. The female group shows slightly higher mean (143.81) as compared to that of male (136.85). although, the spread of scores is larger in male group. The differences in means were further accounted through further analysis.

Table 3: Table showing mean scores of Learning styles.
Group Statistics

Group	N	Mean	Std. Deviation-	S.E. Mean
Learning style M	314	136.85	20.36	1.15
F	176	143.81	18.07	1.36

The differences in mean were further complemented by an independent sample t-test to compare ‘learning styles’ scores for male and female. The Levene’s test so performed assumed equality of variances (F (1, 488) =3.70, p=0.055) the assumption of equality of variances is met. The p-value is less than the typical significance level rejecting the null hypothesis. Hereby, statistically significant difference between male and female was indicated.

Table 4: Table showing t-test of Learning style scores

Independent Samples Test

	Levene's Test for Equality of Variances		T-Test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Learning style Equal variances assumed	3.70	.055	-3.78	488.00	.000	-6.96	1.84	-10.58	-3.34
Equal variances not assumed			-3.90	399.44	.000	-6.96	1.78	-10.46	-3.45

Objective 3: To identify the relation between Attitude towards Mathematics and Learning styles. The Pearson correlation coefficient of 0.307 indicates a small to moderate, positive linear relationship between the variables. The p-value signifies the relationship is statistically significant and assured that observed correlation is unlikely to be due to random chance in the population. Upon calculating the coefficient of determination, R² value of approximately 0.0942. it means 9.42% of variance in Mathematics attitude scores can be explained by learning style scores. The remaining 90.58% is due to other factors like parental support, knowledge etc.

Table 5: Table showing correlation in Attitude towards Mathematics and Learning styles.

Correlations

		Mathematic attitude scores	Learning style
Mathematics attitude scores	Pearson Correlation	1.000	.307 _a
	Sig. (2-tailed)		.000
	N	497	497
Learning style	Pearson Correlation	.307 _a	1.000
	Sig. (2-tailed)	.000	
	N	497	497

a. Significant at .05 level

Findings and conclusion

- The results indicate a highly significant difference in mathematics attitude scores between genders, with female showcasing higher average score than their counterparts.
- There was a statistically significant differences in scores for male and female, females reporting higher learning style.
- There was a statistically significant, positive, albeit moderate correlation between students' attitude and their learning styles.

The attitude and learning styles are important factors that may affect the academic dynamics of students. The differences notified by the results call for necessary educational interventions to improve attitude towards the core subject. The teachers may modify their classroom interactions based on differences in learning styles among male and female group. The students can be encouraged to develop more effective and flexible learning styles. For students to benefit maximally from instructions, learning styles of a few need to be catered.

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