

**Sabnam Sultana**

Research Scholar, Department
of Education, Diamond Harbour
Women's University
sabnamsultanabarasat@gmail.com

**Dr. Usashi Kundu (De)**

Assistant Professor,
Department of Education,
Diamond Harbour Women's
University
usashik@gmail.com

Relationship between Multiple Intelligence and Mathematics Achievement among Secondary School Students

Ms. Sabnam Sultana

Dr. Usashi Kundu (De)

Abstract:

The present study is aimed to study multiple intelligence of male and female secondary school students and its relation between mathematics achievement. In this study 286 male and 281 female students were selected for sample. The researchers used Multiple Intelligence Scale developed by Surbhi Agarwal and Dr. Suraksha Pal (2018) and achievement scores in mathematics obtained by the students in final examinations of class VIII and X. The findings of the study revealed that the highest percentage of secondary school students belong to the above average category in respect of multiple intelligence and to the average category in respect of mathematics achievement. The findings also revealed that there is significant and positive relationship between multiple intelligence and mathematics achievement.

Keywords: *Multiple intelligence, Mathematics achievement, Secondary school student.*

1. Introduction:

In modern times the knowledge that students acquire is not something static, it has become dynamic. Therefore, a lot of issues related with learning are considered while thinking about how to create learning environment or learning experience. Now a days students' need, drive, interest and their aptitude are all considered. So, the process of education is student centric to help them understand subjects better. Intelligence is also a factor for student's achievement. Gardner's multiple intelligence theory states about different types of intelligence. If students are taught according to their intelligence following the theory of Gardner, they will perform better. For mathematics achievement identifying students' intelligence is important. According to Gardner theory those students who have ability to use reason, logic and number, perform better in mathematical achievement. Teachers need to identify students' intelligence and teach them accordingly. Parents also need to guide the students according to their intelligence so that they can excel.

2. Review of Literature:

Kaplan, Duran and Bas (2015)¹ showed that instruction based on multiple intelligence theory in mathematics had an overall positive and moderate effect on the academic achievement. Shahzada, Khan, Islam and Faqir (2014)² found that moderate inter-correlation existed between verbal/linguistic and logical/mathematical intelligences and academic achievement. Ayesha and Khurshid (2013)³ also claimed that multiple intelligence, study skills and academic achievement were significantly positively correlated with each other.

Konwar (2014)⁴ also opined that there was significant difference in the mean scores of male and female learners with respect to their multiple intelligences and that positive relationship existed between multiple intelligence and academic achievement. Girls were found to be higher in the level of multiple intelligence than the boys. Boys were good at spiritual/naturalistic intelligence (Anitha, Vannessa & Sreelakshmi, 2013)⁵.

Nulhakim, Wibawa and Erwin (2019)⁶ found no statistically significant difference between the classroom students' average scores of verbal-linguistic, visual-spatial, naturalistic, musical, logical-mathematical, intrapersonal, and bodily-kinesthetic intelligence areas in terms of the gender and grade level variables. Ozdilek (2010)⁷ found positive low correlations between achievement and mathematical-logical, visual-spatial, and interpersonal intelligences. No real difference existed between male and female students in multiple intelligences (Geeta & Gupta)

¹ Kaplan, A., Duran, M., & Bas, G. (2015). The effects on instruction based on multiple intelligence theory in mathematics course on academic achievement: A meta-analysis study. *Mersin University Journal of the faculty of Education*, 11(3), 814-831. doi: 10.17860/efd.54955.

² Shahzada, G., Khan, U.A., Islam, F. U. & Faqir, K. (2014). Interrelation of multiple intelligences and their correlation with students' academic achievement: A case study of Southern region, Khyber Pakhtunkhwa. *FWU Journal of Social Sciences*, 8(2), 59-64. Retrieved from: <http://www.sbbwu.edu.pk/journal/FWUJournal>

³ Ayesha, B., & Khurshid, F. (2013). The relationship of multiple intelligence and effective study skills with academic achievement among university students. *Global Journal of Human Social Science Linguistics & Education*, 13(1). Retrieved from: <https://www.globaljournals.org>

⁴ Konwar, I. R. H. (2014). Multiple intelligences and its relationship to academic achievement of learners at degree level in Lakhimpur district, Assam. *International Research Journal of Management Sociology & Humanity*, 5(8). Retrieved from: <https://www.academia.edu/9845297>

⁵ Anitha, T. S., Vannessa, J., & Sreelakshmi, G. (2013). A study on the multiple intelligence levels of secondary school students of government and private schools in Secunderabad. *IOSR Journal of Research & Method in Education*, 3(4), 12-15. Retrieved from: <https://www.iosrjournals.org>

⁶ Nulhakim, L., Wibawa, B., & Erwin, T.N. (2019). Relationship between students' multiple intelligence-based instructional areas and assessment on academic achievements. *Journal of Physics: Conf, Series*, 1188(1). doi:10.1088/1742-6596/1188/012086.

⁷ Ozdilek, Z. (2010). To what extent do different multiple intelligences affect sixth grade students' achievement level on the particle model of matter? *Procedia Social and Behavioral Sciences*, 2(2), 4858-4862. doi:10.1016/j.sbspro.2010.03.784.

(2017)⁸. None of the intelligence types correlated in a significant way with the achievement score of students (Salehi & Germai, 2012)⁹.

Handayani and Suwarjo (2019)¹⁰ found that multiple intelligence strategy was effective to increase students' imitating mathematical reasoning skill. Lesson activities addressing linguistic and mathematical-logical intelligences correlated highest with students' mathematical learning (Yilmaz, 2012)¹¹. Kandeel (2016)¹² suggested that there was an impact of visual intelligence, bodily, logical, and sometimes social, musical and natural intelligence on the mathematics achievement.

3. Objectives of the Study:

The objectives of the present study are-

1. To study the nature of multiple intelligence among the students of the secondary stage.
2. To study the nature of mathematics achievement among these students.
3. To identify the relationship between multiple intelligence and mathematics achievement among these students.

4. Hypothesis:

H₀ 1. There is no significant relationship between multiple intelligence and mathematics achievement of the students of the secondary stage.

H₀ 1.1 There is no significant relationship between multiple intelligence and mathematics achievement of the male students of the secondary stage

H₀ 1.2 There is no significant relationship between multiple intelligence and mathematics achievement of the female students of the secondary stage.

⁸ Geeta, N., & Gupta, M. (2017). A study of multiple intelligences of secondary school students of Jodhpur city of Rajasthan state. *International Journal of Research in all Subjects in Multi Languages*, 5(8). Retrieved from: <http://www.rajimr.com/ijsml/wp-content>

⁹ Salehi, M., & Germai, S. (2012). On the relationship between multiple intelligences and achievement among engineering students on the relationship between multiple intelligences and achievement among engineering students. *English for Specific Purposes World*, 12(35). Retrieved from: <https://www.researchgate.net/publication/283122739>

¹⁰ Handayani, M. & Suwarjo. (2019). The effectiveness of multiple intelligences strategies on students' mathematical reasoning imitating skills. *PEDAGOGIA: Journal Pendidikan*, 8(2), 23-34. doi:10.21070/pedagogia.v8i2.2334.

¹¹ Yilmaz, B. (2012). *Engaging 6th grade students with mathematics by using multiple intelligence theory*. (Master's thesis, Bilkent University). Retrieved from: <http://www.thesis.bilkent.edu.tr/0006343>

¹² Kandeel, R. A. A. (2016). Multiple intelligences patterns of student at King Saud University and its relationship with mathematics' achievement. *Journal of Education and Learning*, 5(3), 94-106. doi:10.5539/jel.v5n3p94.

H_0 1.3 There is no significant relationship between multiple intelligence and mathematics achievement of the students of the lower secondary stage.

H_0 1.4 There is no significant relationship between multiple intelligence and mathematics achievement of the students of the higher secondary stage.

5. Methodology of the Study:

5.1 Research Design:

Descriptive survey research design was used to study the relationship between multiple intelligence and mathematics achievement among the students of the secondary stage.

5.2 Sample:

A sample of 286 male and 281 female students studying in class IX and XI in north 24 Parganas was collected from two CBSE board schools.

Table- 1: Sample Profile

Institution	Class	Male	Female	Total
School 1	IX	95	105	200
	XI	85	50	135
	Both IX and X	180	155	335
School 2	IX	55	45	100
	XI	65	100	165
	Both IX and X	120	145	265
All Institutions	Both IX and XI	300	300	600

5.3 Sampling Technique:

The present study deals with the population as secondary school students in north 24 parganas. Total number of CBSE board higher secondary school in north 24 parganas are 110. For taking the sample, investigator randomly selected two school in north 24 parganas. The sample contain all relevant strata namely male and female, higher secondary and lower secondary stage. Here the investigator used stratified random sampling as the population contains different strata.

5.4 Tools Used in the Study:

Multiple Intelligence Scale developed by Surbhi Agarwal and Dr. Suraksha Pal (2018) and achievement scores in mathematics obtained by the students in final examinations of class VIII and X were used for the study. The final draft of the multiple intelligence scale has 90 items, 10 items in each dimension.

5.4.1 Standardization of the Scale:

The final draft of the multiple intelligence scale with 90 items was administered on a fresh sample of 200 students randomly selected from English medium schools of Meerut, Greater

Noida and Ghaziabad, studying in class X, XI and XII and were in the age range of 14 to 18 years. This sample was also gender-wise equally divided, that is, 100 boys and 100 girls.

5.4.2 Reliability:

The consistency of scores or measurement which is reflected in the reproducibility of the scores is called reliability. The reliability of the scale was measured by both test-retest method and split half method. For calculating coefficient of stability by test-retest method, after 15 days of the first test, retest was conducted on 100 senior secondary students of the same level. Reliability was found by finding out the correlation. The splitting of sample was done on odd-even basis to calculate reliability by split half method. Coefficient of stability and equivalence was found by Spearman-Brown Prophecy formula.

5.4.3 Validity:

Content validity and intrinsic validity was estimated for this multiple intelligence scale. Content validity was established on the basis of expert opinion from professors in the field of Psychology and Measurement, Education, Sociology and English. Thus, on the basis of unanimous suggestions and agreements the validation of the inventory was obtained. Intrinsic validity of the multiple intelligence scale was found by finding the product moment correlations among various dimensions of multiple intelligence.

8. Results/ Findings:

As per the first objective, to study the nature of multiple intelligence of secondary stage students, this sub-section deals with the analysis related to interpretation of total multiple intelligence as well as the various dimensions of multiple intelligence. This is also presented as per the category of gender (male and female) and level (lower secondary and higher secondary).

Table- 2: Percentage of secondary school students having different levels of multiple intelligence

Sl. No.	Level of Multiple Intelligence	Range of Z-score	N	%
1	Extremely High	+2.01 and above	0	0.00
2	High	+1.26 to +2.00	3	0.53
3	Above Average	+0.51 to +1.25	333	58.73
4	Average	-0.50 to +0.50	231	40.74
5	Below Average	-1.25 to -0.51	0	0.00
6.	Low	-2.00 to -1.26	0	0.00
7.	Extremely Low	-2.01 and below	0	0.00

Table 2 shows that 0.53%, 58.73% and 40.74% students belong to high level, above average and average level of multiple intelligence. No student belongs to the extremely high, below average, low and extremely low category of multiple intelligence.

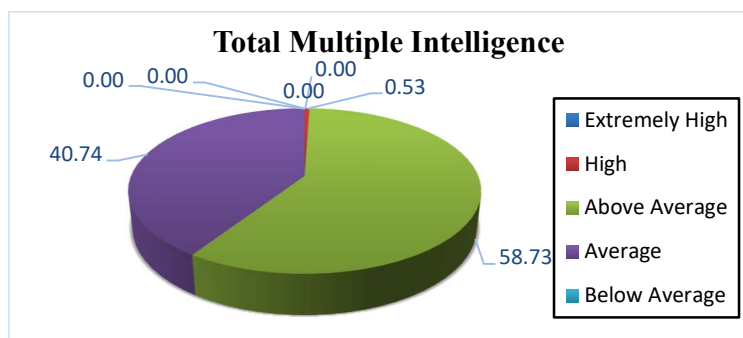


Figure -1: Percentage of secondary school students' having different levels of multiple intelligence

Table 3: Gender wise % of secondary school students having different levels of multiple intelligence

Sl. No.	Level of Multiple Intelligence	Male		Female	
		N	%	n	%
1	Extremely High	0	0.00	0	0.00
2	High	2	0.70	1	0.36
3	Above Average	181	63.29	152	54.09
4	Average	103	36.01	128	45.55
5	Below Average	0	0.00	0	0.00
6	Low	0	0.00	0	0.00
7	Extremely Low	0	0.00	0	0.00
	Total	286	100.00	281	100.00

Table 3 shows gender wise percentage of secondary school students' different levels of multiple intelligence. The highest percentage of male and female students belong to above average category with 63.29% and 54.09% respectively. 36.01% male students and 45.55% female students belong to average category. Only 0.70% male students belong to high category compared to 0.36% female students in it.

Table 4: Level wise percentage of secondary school students' multiple intelligence

Sl. No.	Level of Multiple Intelligence	Higher Secondary		Lower Secondary	
		N	%	n	%
1	Extremely High	0	0.00	0	0.00
2	High	0	0.00	3	1.06
3	Above Average	161	56.69	172	60.78
4	Average	123	43.31	108	38.16
5	Below Average	0	0.00	0	0.00

6	Low	0	0.00	0	0.00
7	Extremely Low	0	0.00	0	0.00
	Total	284	100.00	283	100.00

Table 4 shows that 56.69% of higher secondary students and 60.78% of lower secondary students belong to above average category. 43.31% of higher secondary students belong to average category compared to 38.16% lower secondary students in it.

Table 5: Descriptive statistics scores of Multiple Intelligence (total)

Variable	N	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Multiple Intelligence	567	232	330	98	281.99	.806	368.767	19.203

From table 5 the calculated mean and standard deviation values of the total sample are found to be 281.99 and 19.203. The mean value belongs above average level of multiple intelligence.

Table 6: Measures of normality of multiple intelligence scores for the total sample

Variable	Skewness			Kurtosis			Shapiro-wilk		Sig.
	Stat.	Std. Error	z- Value	Stat	Std. Error	z-value	Stat.	Df	
Multiple Intelligence	-.100	.103	-0.97	-.174	.205	-0.848	.995	567	.077

Table 6 shows the skewness and kurtosis value of multiple intelligence in total. Here skewness z-value is -0.97 and kurtosis z-value is -0.848 which are both within the range ± 1.96 . It can be said regarding skewness and kurtosis that the data are normally distributed. The p value in Shapiro-wilk test is found to be 0.077 which is above 0.05. So, in terms of the Shapiro-Wilk test, it is assumed that the total sample is normally distributed in terms of multiple intelligence scores.

Table 7 : Descriptive statistics of multiple intelligence of male and female lower secondary students

Gender	N	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Male	142	234	330	96	286.13	1.477	309.748	17.600
Female	141	239	330	91	282.30	1.551	339.299	18.420

From table 7 the mean scores of male and female lower secondary students' multiple intelligence are found to be 286.13 and 282.30 respectively. The mean scores belong to above average level of multiple intelligence. It also indicates that on average male lower secondary students are higher in multiple intelligence than their counterparts.

Table 8: Measures of normality of multiple intelligence of male and female lower secondary students

Gender	Skewness			Kurtosis			Shapiro-wilk		
	Stat.	Std. Error	z-value	Stat.	Std. Error	z-value	Stat.	df	Sig.
Male	.305	.203	1.50	.042	.404	0.10	.977	142	.018
Female	-.090	.204	-0.44	-.246	.406	-0.60	.993	141	.724

From table 8 z-value of skewness and kurtosis of multiple intelligence for male are found to be 1.50 and 0.10 respectively and for the female are -0.44 and -0.60 respectively. All the values are within the range ± 1.96 . Hence, it can be said regarding skewness and kurtosis that the data are normally distributed. The p value in Shapiro-wilk test is found to be .724 for the female lower secondary students which is above 0.05. So, in terms of the Shapiro-Wilk test, it is assumed that the female lower secondary students are normally distributed in terms of multiple intelligence scores.

Table 9 : Descriptive statistics of multiple intelligence of male and female higher secondary students

Gender	N	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Male	144	232	327	95	283.95	1.690	411.193	20.278
Female	140	235	323	88	275.46	1.599	358.107	18.924

From table 9 the mean score of male and female higher secondary students' multiple intelligence are found to be 283.95 and 275.46 respectively. The mean scores of the female students belong to the average category and the mean scores of the male students belong to the above average category of multiple intelligence. It also indicates that the male higher secondary students scored higher in multiple intelligence than the female higher secondary students.

Table 10 : Measures of normality of multiple intelligence of male and female higher secondary students

Gender	Skewness			Kurtosis			Shapiro-wilk		
	Stat.	Std. Error	z-value	Stat.	Std. Error	z-value	Stat.	Df	Sig.
Male	-.368	.202	-1.82	-.230	.401	-0.573	.983	144	.077
Female	-.055	.205	-0.268	-.351	.407	-0.862	.989	140	.316

From table 10 z-value of skewness and kurtosis of multiple intelligence for male are found to be -1.82 and -0.573 and for the female are -0.268 and -0.862 respectively which are within ± 1.96 and hence it is assumed that the data are approximately normally distributed. The calculated p values for male and female higher secondary students in Shapiro-wilk test are found to be 0.077 and .316 respectively which are above 0.05. So, in terms of the Shapiro-wilk test, it is assumed that data collected from both male and female higher secondary students are normally distributed in terms of multiple intelligence scores.

As per the second objective, to study the nature of mathematics achievement of secondary stage students, this sub-section deals with the analysis related to interpretation of data in

mathematics achievement. This is also presented as per the category of gender (male and female) and level (lower secondary and higher secondary).

Table 11 : Percentage of secondary school students' mathematics achievement

Sl. No.	Level of Mathematics Achievement	Range of Z-score	N	%
1.	Above Average	+1.001 and above	109	19.22
2.	Average	-1.0 to +1.0	370	65.26
3.	Below Average	-1.001 and below	88	15.52

Table 11 shows that the highest percentage (65.26%) of secondary school students belong to the average category in respect of mathematical achievement. 19.22% and 15.52% students belong to above average and below average category respectively.

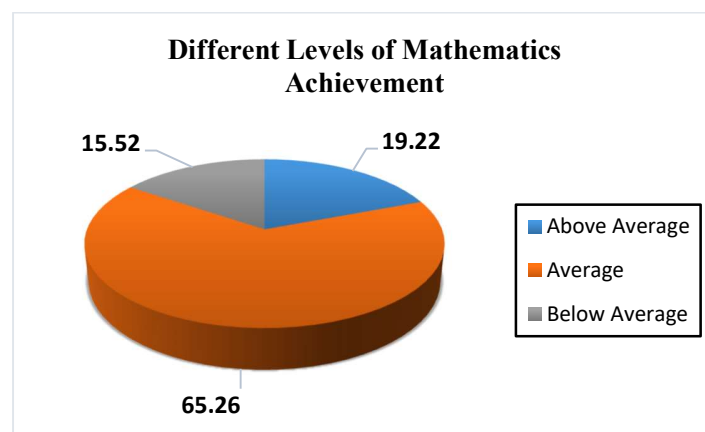


Figure 2 : Figure showing the percentage of secondary school students having different levels of mathematics achievement

Table 12: Gender wise % of secondary school students having different levels of mathematics achievement

Sl. No.	Levels of Mathematics Achievement	Male			Female		
		Range of z- score	N	%	Range of z- score	n	%
1	Above Average	+1.001 and above	61	16.78	+1.001 and above	48	17.08
2	Average	-1.0 to +1.0	177	66.43	-1.0 to +1.0	193	68.68
3	Below Average	-1.001 and below	48	16.78	-1.001 and below	40	14.23
Total			286	100.00		281	100.00

Table 12 shows that highest percentage of male and female students belong to average category in respect of mathematics achievement with 66.43% and 68.68% respectively. In the above average category there are 16.78% male students and 17.08% female students. Only 16.78% male students and 14.23% female students are of below average category in mathematics achievement.

Table 13 : Table showing the stage wise percentage of secondary school students having different levels of mathematics achievement

Sl. No.	Levels of Mathematics Achievement	Lower Secondary			Higher Secondary		
		Range of z- Score	N	%	Range of z- Score	n	%
1	Above Average	+1.001 and above	40	14.84	+1.001 and above	69	16.55
2	Average	-1.0 to +1.0	191	69.26	-1.0 to +1.0	179	64.44
3	Below Average	-1.001 and below	52	15.90	-1.001 and below	36	19.01
	Total		283	100.00		284	100.00

Table 13 depicts that the highest number of lower secondary students and higher secondary students belong to average category in respect of mathematics achievement with 69.26% and 64.44% respectively. 14.84% lower secondary students and 16.55% higher secondary students belong to above average category. Only 15.90% lower secondary and 19.01% higher secondary students belong to below average category in mathematics achievement.

Table 14: Table showing descriptive statistics of mathematics achievement scores

Variable	n	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Mathematics Achievement	567	49	100	51	80.29	.488	135.096	11.623

From the table 14 the calculated mean and standard deviation values of the total sample are found to be 80.29 and 11.623.

Table 15 : Table showing the value of skewness and kurtosis of mathematics achievement scores

Variable	Skewness			Kurtosis			Shapiro-wilk		
	Stat.	Std. Error	z-Value	Stat	Std. Error	z-value	Stat.	df	Sig.
Mathematics Achievement	-.486	.103	-4.71	-.339	.205	-1.65	.971	567	.000

Table 15 shows the skewness and kurtosis value of mathematics achievement scores. Here skewness z-value is -4.71 and kurtosis z-value is -1.65.

Table 16 : Descriptive statistics of mathematics achievement scores of male and female lower secondary students

Gender	N	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Male	142	50	99	49	78.46	.977	135.46	11.64

Female	141	49	100	51	79.28	.949	127.02	11.27
--------	-----	----	-----	----	-------	------	--------	-------

From table 16 the mean scores of male and female lower secondary students in mathematics achievement are found to be 78.46 and 79.28 respectively. It also indicates that there exists very slight difference in mathematics achievement scores between male and female lower secondary students.

Table 17: Measures of normality of mathematics achievement scores of male and female lower secondary students

Gender	Skewness			Kurtosis			Shapiro-wilk		
	Stat.	Std. Error	z-value	Stat.	Std. Error	z-value	Stat.	df	Sig.
Male	-.410	.203	-2.02	-.614	.404	-1.51	.967	142	.002
Female	-.331	.204	-1.62	-.109	.406	-0.26	.980	141	.038

From table 17 z-value of skewness and kurtosis of mathematics achievement scores for male are found to be -2.02 and -1.51 and for the female are -1.62 and -0.26 respectively which are within +/-1.96 and hence it is assumed that the scores are approximately normally distributed.

Table 18 : Descriptive statistics of mathematics achievement scores of male and female higher secondary students

Gender	N	Min	Max	Range	M		Variance	SD
					Stat.	Std. Error		
Male	144	49	100	51	82.90	.10	143.60	11.98
Female	140	50	100	50	80.48	.95	125.50	11.20

From table 18 the mean scores of male and female higher secondary students in mathematics achievement are found to be 82.90 and 80.48 respectively. It also indicates that the male higher secondary students scored better than their counterparts in mathematics achievement.

Table 19 : Measures of normality of mathematics achievement scores of male and female higher secondary students

Gender	Skewness			Kurtosis			Shapiro-wilk		
	Stat.	Std. Error	z-value	Stat.	Std. Error	z-value	Stat.	df	Sig.
Male	-.878	.202	-4.305	.203	.401	0.506	.929	144	.000
Female	-.392	.205	-1.912	-.365	.407	-0.896	.975	140	.011

From table 19 z-value of skewness and kurtosis of mathematics achievement for male higher secondary students are found to be -4.305 and 0.506 and for the female are -1.912 and -0.896 respectively which are within +/-1.96 and hence it is assumed that the scores are approximately normally distributed.

As per the third objective to find out the relationship between multiple intelligence and mathematics achievement of the secondary stage students, this section deals with analysis related to interpretation of the relationship between these variables. This is presented as per the category gender (male and female) and level (lower secondary and higher secondary) and in total.

Table 20 :Table showing Pearson's Correlation between multiple intelligence and mathematics achievement

Categorical variable		<i>N</i>	<i>R</i>
Gender	Male	286	0.153**
	Female	281	0.071
Level	Lower Secondary	283	0.147**
	Higher Secondary	284	0.123**
Total		567	0.118**

From the table 20 it is shown that multiple intelligence of secondary stage students is positively and significantly related to their mathematics achievement. The co-efficient of correlation value (r) is 0.118 for the total sample which is significant at 1% level. Here, it is also found that there is a positive and significant relationship between multiple intelligence and mathematics achievement of male secondary stage students. But in case of the female students the correlation coefficient is not significant. The co-efficient of correlation value (r) are 0.153 (significant at 1% level) and 0.071 for males and females respectively. The co-efficient of correlation value (r) found are 0.147 (significant at 5% level) and 0.123 (significant at 5% level) which indicated a positive relationship among multiple intelligence and mathematics achievement of lower secondary and higher secondary students.

9. Discussion:

In multiple intelligence the highest percentage of students belongs to above average and average level which are 58.73% and 40.74% respectively of all. No student belongs to the extremely high, below average, low and extremely low category of multiple intelligence. The highest percentage of male and female students belong to above average category with 63.29% and 54.09% respectively. And it is also shown that 56.69% of higher secondary students and 60.78% of lower secondary students belong to above average category.

In mathematics achievement the highest percentage (65.26%) of secondary school students belong to the average category. Highest percentage of male and female students belong to average category in respect of mathematics achievement with 66.43% and 68.68% respectively. It is also depicted that the highest number of lower secondary students and higher secondary students belong to average category in respect of mathematics achievement with 64.44% and 69.26% respectively.

Regarding skewness and kurtosis, it can be said that the data are normally distributed and also the data collected for both male and female higher secondary students are normally distributed in terms of multiple intelligence and mathematics achievement scores. This study reveals that

there is very slight difference of male and female secondary students in terms of multiple intelligence and mathematics achievement.

The result shown that multiple intelligence of secondary stage students is positively and significantly related to their mathematics achievement.

10. Implications:

The teaching-learning process needs to include multiple intelligence. So, the students should have the opportunities to develop all types of intelligence and not just one type of intelligence. Teachers should create such an environment, which is favorable for the development of all the intelligences, keeping in view individual differences of the students.

11. Delimitation:

- 1) The study is limited to secondary school students only
- 2) The study would be limited to co-ed school in CBSE Board

12. Suggestions for further Studies:

- A study on relationship between multiple intelligences and achievement in subjects other than mathematics can be done.
- A study on relationship between multiple intelligences and achievement in mathematics can be done by taking a sample of primary or upper primary school students

References:

- Anitha, T. S., Vannessa, J., & Sreelakshmi, G. (2013). A study on the multiple intelligence levels of secondary school students of government and private schools in Secunderabad. *IOSR Journal of Research & Method in Education*, 3(4), 12-15. Retrieved from: <https://www.iosrjournals.org>
- Ayesha, B., & Khurshid, F. (2013). The relationship of multiple intelligence and effective study skills with academic achievement among university students. *Global Journal of Human Social Science Linguistics & Education*, 13(1). Retrieved from: <https://globaljournals.org>
- Geeta, N., & Gupta, M. (2017). A study of multiple intelligences of secondary school students of Jodhpur city of Rajasthan state. *International Journal of Research in all Subjects in Multi Languages*, 5(8). Retrieved from: <http://www.Raijmr.com/ijrsm/ wp-content>
- Handayani, M. & Suwarjo. (2019). The effectiveness of multiple intelligences strategies on students' mathematical reasoning imitating skills. *PEDAGOGIA: Journal Pendidikan*, 8(2), 23-34. doi:10.21070/pedagogia.v8i2.2334.
- Kandeel, R. A. A. (2016). Multiple intelligences patterns of student at King Saud University and its relationship with mathematics' achievement. *Journal of Education and Learning*, 5(3), 94-106. doi:10.5539/jel.v5n3p94.
- Kaplan, A., Duran, M., & Bas, G. (2015). The effects on instruction based on multiple intelligence theory in mathematics course on academic achievement: A meta-analysis study. *Mersin University Journal of the faculty of Education*, 11(3), 814-831. doi: 10.17860/efd.54955.
- Konwar, I. R. H. (2014). Multiple intelligences and its relationship to academic achievement of learners at degree level in Lakhimpur district, Assam. *International Research Journal of Management Sociology & Humanity*, 5(8). Retrieved from: <https://www.academia.edu/9845297>
- Nulhakim, L., Wibawa, B., & Erwin, T.N. (2019). Relationship between students' multiple intelligence-based instructional areas and assessment on academic achievements. *Journal of Physics: Conf, Series*, 1188(1). doi:10.1088/1742-6596/1188/012086.

- Ozdilek, Z. (2010). To what extent do different multiple intelligences affect sixth grade students' achievement level on the particle model of matter? *Procedia Social and Behavioral Sciences*, 2(2), 4858-4862. doi:10.1016/j.sbspro.2010.03.784.
- Shahzada, G., Khan, U.A., Islam, F. U. & Faqir, K. (2014). Interrelation of multiple intelligences and their correlation with students' academic achievement: A case study of Southern region, Khyber Pakhtunkhwa. *FWU Journal of Social Sciences*, 8(2), 59-64. Retrieved from: <http://sbbwu.edu.pk/journal/FWUJournal>
- Salehi, M., & Germai, S. (2012). On the relationship between multiple intelligences and achievement among engineering students on the relationship between multiple intelligences and achievement among engineering students. *English for Specific Purposes World*, 12(35). Retrieved from: <https://www.researchgate.net/publication/283122739>.
- Yilmaz, B. (2012). *Engaging 6th grade students with mathematics by using multiple intelligence theory*. (Master's thesis, Bilkent University). Retrieved from: <http://www.thesis.bilkent.edu.tr/0006343>