ISSN -2231-1432

INDIAN JOURNAL OF PSYCHOLOGY & EDUCATION (IJPE)

Volume 11, Number 2, July, 2021

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Intellectual Foundation(India)

Published By

INTELLECTUAL FOUNDATION (INDIA)

A Foundation of Education

www.ijpe.co.in

ISSN -2231-1432

INDIAN JOURNAL OF PSYCHOLOGY & EDUCATION (IJPE)

Volume 11, Number 2, July, 2021

Peer Reviewed Journal
Indexed in : Indian Citation Index

Published By
INTELLECTUAL FOUNDATION (INDIA)
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Indian Journal of Psychology and Education
July, 2021, Vol. 11, No. 2, pp 36-44

Influence of Achievement Motivation on Secondary School Students' Achievement in Mathematics

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Abstract

Mathematics is a compulsory subject in the secondary school curriculum and is also necessary for studying different science courses in colleges and universities. Achievement motivation of a student is said to be an essential component for bringing in success or the attainment of excellence in mathematics. The purpose of the research was to study the effect of achievement motivation on mathematics achievement of secondary school students. 300 students of Class XI were selected by purposive sampling technique from Kolkata and PurbaMedinipur district of West Bengal. Data were collected using survey method. The Achievement Motivation Scale (n-Ach) developed by Deo and Mohan (2018)was administered to the sample and the scores of the students inMadhyamik Examination were taken as mathematics achievement scores. The obtained data were analysed through *t* test and ANOVA.The results revealed that there exists significant effect of achievement motivation on mathematics achievement of the rural and urban as well as the male and female students of the secondary stage. The findings further indicate that if a student is motivated towards his achievement, the level of mathematics achievement increases. The results of the present study has immense implications for educational planners, administrators, teachers, parents and above all the society.

Keywords: Achievement motivation, mathematics achievement, secondary students

Mathematics is one of the most important core subjects insecondary school curriculum. It is a compulsory subject in schools and serves as an opening to different challenging courses which are often denied to those who are not proficient in it (Ghosh, 2018). In spite of the great importance that is being laid upon the subject of mathematics, parents, educators, administrators, and policy makers are worried aboutthe failure rates of students in mathematics at both internal and external examinations (James, Tunde, Ademuyiwa&Bolanle, 2013). Among the frequently mentioned variables, achievement motivation among the students plays a vital role for their performance in mathematics. Individuals vary in their degree of motivation to perform well in the subject because each one develops his or her achievement motivation through the process of learning and socialization.

Motivation is generally defined as an internal condition that stimulates, directs and maintains behaviour. There is an intensive relationship between learning and motivation. According to Abraham Maslow, as an individual satisfies his or her need for love and belongingness, he or she thrives for higher order needs like need for intellectual achievement and his urge to learn increases (Woolfolk, 2004).

Need for Achievement (nAch) (McClelland, 1961; McClelland & Winter, 1969) is claimed to be one of the psychological motives that determines the success and achievement of a person. Achievement motivation has been defined as the extent to which individuals vary in their need to struggle to gain rewards, such as physical satisfaction, praise from others and feelings of personal mastery (McClelland, 1985). It is an affect in association with evaluated performance in which competition with a standard of excellence is important (McClelland, Atkinson, inculcate or to keep as high as possible, one's own capabilities in all activities in which a standard of excellence is thought to apply and where performing such activities can, therefore either succeed or fail (Heckhausen, 1967). Atkinson (1977) defines it as an essential criteria to start off a task, to attain success and to avoid underachievement.

McClelland (1962) opined that individuals with high achievement usually take reasonable risks. They involve themselves in activities that can be achieved through challenge, which subsequently brings inner satisfaction to them. On the other hand, a low need for achievement is associated with a sense of low competence, low expectations, and orientation toward failure (Atkinson, 1977; Nicholls, 1976). Keefe and Jenkins (1993) stated that people with high achievement motivation generally perform well in academics and sustenance of motivation plays a vital role in ensuring success.Researchers mentioned that achievement motivation moderated the relationship between learning approaches and academic achievement of college students (Bakhtiarv, Ahmadian, Delrooz, &Farahani, 2011).Studies also reveal that achievement motivation plays a significant role in determining students' academic achievement (Singh, 2011; Suman&Umapathy, 1997; Alam, 2001, Chetri, 2014, Suresh, 2015, Kumari&Chamundeswari, 2015; Rather, 2016) and therefore both parents and educators should inculcate and encourage children to develop academic motivation from an early age (Singh, 2011). Achievement motivation and self concept are significantly related to academic achievement in mathematics and significant gender differences are discovered, which favoured girls (Awan, Noureen, &Naz, 2011). On the contrary,Onete, Edet, Udey, &Ogbor (2012) claimed that neither academic

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motivation of first year education students had any significant influence on their academic achievement.Research on gender difference in achievement motivation shows varied results. Senior high school male students showed higher achievement motivation than the females (Liu & Zhu, 2009) while in another study, gender differences were discovered which were in support of girls (Awan, Noureen, &Naz, 2011).It was also observed that male and female senior secondary students inUyo metropolis did not differ in their academic achievement motivation (Okoro&Udoh, 2014). Ahluwalia (1985), Suman and Umapathy (1997), and Kaur (2013) also mentioned that gender of a child has no role in achievement motivation.

Studies reveal that there exists a widespread gender specific image of mathematics in the society. The mathematical approach of urban male students to understand the subject is better than both urban and rural female students. Performance of rural males is proportionally better than rural females (Nematullah&Gulshan, 2015). While another study also shows that females outperform males in mathematics achievement (Alkhateeb, 2009). No gender difference has also been reported by Ajai and Imoko (2015).

Objectives

Based on the above mentioned background the researchers attempted to:

(i) Discuss the nature of achievement motivation and mathematics achievement among the students of secondary stage.

(ii) Find out the effect of achievement motivation on mathematics achievement of the students.

Hypotheses

$H_0$1: There is no significant difference between achievement motivation of the rural and urban students of the secondary stage.

$H_0$2: There is no significant difference between mathematics achievement of the rural and urban students of the secondary stage.

$H_0$3: There is no significant difference between achievement motivation of the male and female students of the secondary stage.

$H_0$4: There is no significant difference between mathematics achievement of the male and female students of the secondary stage.

$H_0$5:There is no significant effect of achievement motivation on mathematics achievement of the students of the secondary stage.

$H_0$5.1:There is no significant effect of achievement motivation on mathematics achievement of the rural students of the secondary stage.

$H_0$5.2:There is no significant effect of achievement motivation on mathematics achievement of the urban students of the secondary stage.

$H_0$5.3:There is no significant effect of achievement motivation on mathematics achievement of the male students of the secondary stage.

$H_0$5.4:There is no significant effect of achievement motivation on mathematics achievement of the female students of the secondary stage.

Method

Sample

300 students of class XI were selected by purposive sampling technique from schools of Kolkata and PurbaMedinipur district of West Bengal. 170 students (79 males and 91 females) were selected from rural schools and 130 students (70 males and 60 females) were selected from the urban schools. The sample profile has been shown in Table 1.

Table 1. Sample Profile

School Code	Locality	Male	Female	Total
01	Rural	47	52	99
02		32	39	71
03	Urban	35	35	70
04		35	25	60
Total		149	151	300

Tools

The following tools were used:

- Achievement Motivation Scale (n-Ach) (1985) developed by Deo and Mohan(2018).
- The scores of the students in Madhyamik Examination have been taken as mathematics achievement scores.

Results and Discussion

Achievement motivation

Table 2. Mean (M) and Standard Deviation (SD) of Achievement Motivation of the Sample (Area Wise)

	Rural	Urban	Combined Group
Mean	149.20	158.80	153.36
Standard Deviation	20.40	21.51	21.39
Sample Size (n)	170	130	300

From Table 2, it is found that the mean of achievement motivation scores for the combined, rural and urban groups are within the average range. Urban students' mean achievement motivation score is higher than the rural students' of the secondary stage.

Table 3. Mean (M) and Standard Deviation (SD) of Achievement Motivation the Sample (Gender Wise)

	Male	Female	Combined Group
Mean	151.80	154.90	153.36
Standard Deviation	21.65	21.09	21.39
Sample Size (n)	149	151	300

From Table 3, it is found that the mean of achievement motivation scores for the combined, male, and female groups are within the average range. Female students' mean achievement motivation score

is higher than the male students' of the secondary stage.

From Table 6, it is found that the mean of mathematics achievement scores for the combined,

Table 4. Statistical Comparison between Rural and Urban Students' Achievement Motivation

Sample Size of Rural Students	Sample Size of Urban Students	Mean Score of Rural Students	Mean Score of Urban Students	*p*-value of Levene's Test for Equality of Variances	*t* Test Used	*t*	df	*p*-value of Appropriate *t* Test
170	130	149.20	158.80	.346	Equal Variances	-3.944	298	**.000**

From Table 4, it is found that the difference between the pair of mean scores of achievement motivation of the rural and urban students is significant at 1% and even at 5% levels (H_o1 is rejected at both 1% and 5% levels). Therefore, the result establishes the fact that there exists significant difference between achievement motivation of rural and urban students, the mean score of urban students being significantly higher than that of the rural students of the secondary stage.

From Table 5, it is found that the difference between the pair of mean scores of achievement motivation of male and female students is not significant at 1% and even at 5% levels (i.e., the hypothesis H_o2 is not rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists no significant difference between achievement motivation of male and female students of the secondary stage.

Table 5. Statistical Comparison between Male and Female Students' Achievement Motivation

Sample Size of Male Students	Sample Size of Female Students	Mean Score of Male Students	Mean Score of Female Students	*p*-value of Levene's Test for Equality of Variances	*t* Test Used	*t*	df	*p*-value of Appropriate *t* Test
149	151	151.80	154.90	.915	Equal Variances	-1.257	298	.210

Mathematics Achievement

Table 6. Mean (M) and Standard Deviation (SD) of Mathematics Achievement of the Sample (Area Wise)

	Rural	Urban	Combined Group
Mean	45.57	48.59	46.88
Standard Deviation	15.08	18.94	16.90
Sample Size	170	130	300

From Table 6, it is found that the mean of mathematics achievement scores for the combined, rural and urban groups are within the average range. Urban students' mean mathematics achievement score is higher than the rural students' of the secondary stage.

Table 7. Mean (M) and Standard Deviation (SD) of Mathematics Achievement of the Sample (Gender Wise)

	Male	Female	Combined Group
Mean	45.81	47.93	46.88
Standard Deviation	17.13	16.65	16.90
Sample Size	149	151	300

From Table 7, it is found that the mean of mathematics achievement scores for the combined, male and female groups are within the average range. Female students' mean mathematics achievement score is higher than the male students' of the secondary stage.

From the Table 8, it is found that the difference between the pair of mean scores of mathematics achievement of rural and urban students is not significant at 1% and even at 5% levels (i.e., the hypothesis H_o3 is not rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists no significant difference between mathematics achievement of rural and urban students of the secondary stage.

From Table 9, it is found that the difference between significant difference between mathematics

Table 8. Statistical Comparison between Rural and Urban Students' Mathematics Achievement

Sample Size of Rural Students	Sample Size of Urban Students	Mean Score of Rural Students	Mean Score of Urban Students	*p*-value of Levene's Test for Equality of Variances	*t* Test Used	*t*	df	*p*-value of Appropriate *t* Test
170	130	45.57	48.59	.046	Unequal Variances	-1.493	241.17	.137

Table 9.Statistical Comparison between Male and Female Students' Mathematics Achievement

Sample Size of Male Students	Sample Size of Female Students	Mean Score of Male Students	Mean Score of Female Students	*p*-value of Levene's Test for Equality of Variances	*t* Test Used	*t*	df	*p*-value of Appropriate *t* Test
149	151	151.80	154.90	.915	Equal Variances	-1.257	298	.210

Table 10. Descriptive Statistics of the Total Sample (Achievement Motivation)

Code	Level of Achievement Motivation	N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
1	Highly Motivated	14	75.00	14.79	3.96	66.46	83.54	50	95
2	High Motivation	25	59.64	20.60	4.1	51.14	68.14	29	98
3	Above Average Motivation	65	51.09	15.29	1.90	47.30	54.88	29	90
4	Average Motivation	73	47.55	15.38	1.80	43.96	51.14	25	93
5	Below Average Motivation	87	38.56	11.67	1.26	36.08	41.05	25	77
6	Low Motivation	28	38.96	10.35	1.96	34.95	42.98	26	60
7	Lowest Motivation	8	35.63	9.77	3.46	27.46	43.79	25	52
Total		300	46.88	16.90	.976	44.96	48.80	25	98

the pair of mean scores of mathematics achievement of male and female students is not significant at 1% and even at 5% levels (i.e., the hypothesis $H_0 4$ is not rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists no achievement of male and female students of the secondary stage.

Table 11. ANOVA of the Total Sample

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	25112.16	6	4185.36	20.35	**.000**
Within Groups	60259.53	293	205.67		
Total	85371.68	299			

Effect of Achievement Motivation on Mathematics Achievement

From Table 11, it is found that the F value for the total sample is significant at 1% and even at 5% levels (i.e., the hypothesis H_o5 is rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists significant effect of achievement motivation on mathematics achievement

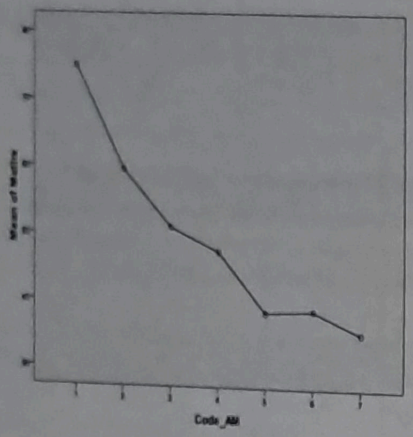

Figure 1. Means Plot of the Total Sample

of the students of the secondary stage.

From Table 13, it is found that the F value for the rural students is significant at 1% and even at 5% levels (i.e., the hypothesis $H_o5.1$ is rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists significant effect of achievement motivation on mathematics achievement of the urban students of the secondary stage.

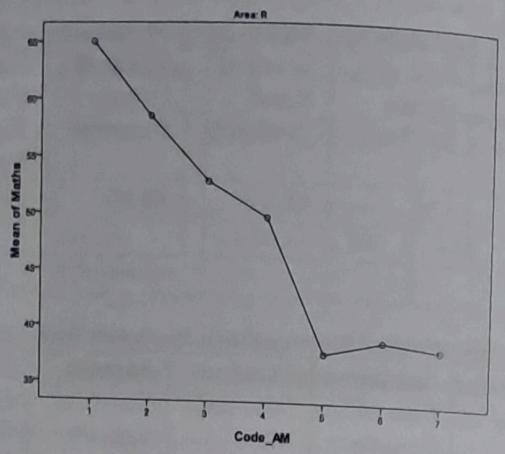

Figure 2. Means Plot of the Rural Students

achievement motivation on mathematics achievement of the rural students of the secondary stage.

room Table 15, it is found that the F value for the urban students is significant at 1% and even at 5% levels (i.e., the hypothesis $H_o5.2$ is rejected at 1% as well as 5% levels). Therefore, the result establishes

Table 12. Descriptive Statistics of the Rural Students (Achievement Motivation)

Code	Level of Achievement Motivation	N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
1	Highly Motivated	4	65.00	11.61	5.80	46.53	83.47	50	76
2	High Motivation	8	58.50	14.22	5.03	46.61	70.39	42	79
3	Above Average Motivation	33	52.82	13.88	2.42	47.90	57.74	30	80
4	Average Motivation	44	49.70	16.09	2.43	44.81	54.60	25	90
5	Below Average Motivation	51	37.75	11.30	1.58	34.57	40.92	25	72
6	Low Motivation	24	38.92	10.69	2.18	34.40	43.43	26	60
7	Lowest Motivation	6	38.33	9.79	4.00	28.06	48.61	25	52
Total		170	45.57	15.08	1.16	43.29	47.85	25	90

Table 13.ANOVA of the Rural Students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9832.73	6	1638.79	9.34	**.000**
Within Groups	28602.92	163	175.48		
Total	38435.65	169			

From Table 17, it is found that the F value for the male students is significant at 1% and even at 5%

Table 14. Descriptive Statistics of the Urban Students (Achievement Motivation)

Code	Level of Achievement Motivation	N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
1	Highly Motivated	10	79.00	14.45	4.57	68.66	89.34	57	95
2	High Motivation	17	60.18	23.38	5.67	48.15	72.20	29	98
3	Above Average Motivation	32	49.31	16.65	2.94	43.31	55.31	29	90
4	Average Motivation	29	44.28	13.85	2.57	39.01	49.55	25	93
5	Below Average Motivation	36	39.72	12.23	2.04	35.58	43.86	25	77
6	Low Motivation	4	39.25	9.43	4.72	24.25	54.25	27	50
7	Lowest Motivation	2	27.50	3.54	2.50	-4.27	59.27	25	30
Total		130	48.59	18.94	1.66	45.31	51.88	25	98

Table 15. ANOVA of the Urban Students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16155.78	6	2692.63	11.00	**.000**
Within Groups	30107.61	123	244.78		
Total	46263.39	129			

Table 16. Descriptive Statistics of the Male Students (Achievement Motivation)

Code	Level of Achievement Motivation	N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
1	Highly Motivated	7	77.29	14.58	5.51	63.80	90.77	60	95
2	High Motivation	10	58.00	20.97	6.63	43.00	73.00	30	98
3	Above Average Motivation	29	51.97	16.54	3.07	45.68	58.25	30	90
4	Average Motivation	41	46.20	15.11	2.36	41.43	50.96	25	93
5	Below Average Motivation	42	37.95	11.49	1.77	34.37	41.53	25	62
6	Low Motivation	14	34.93	9.68	2.59	29.34	40.51	26	60
7	Lowest Motivation	6	36.83	10.34	4.22	25.98	47.69	25	52
Total		149	45.81	17.13	1.40	43.04	48.59	25	98

Table 17. ANOVA of the Male Students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14260.24	6	2376.71	11.57	**.000**
Within Groups	29182.50	142	205.51		
Total	43442.74	148			

levels (i.e., the hypothesis $H_o5.3$ is rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists significant effect of achievement motivation on mathematics achievement of the male students of the secondary stage.

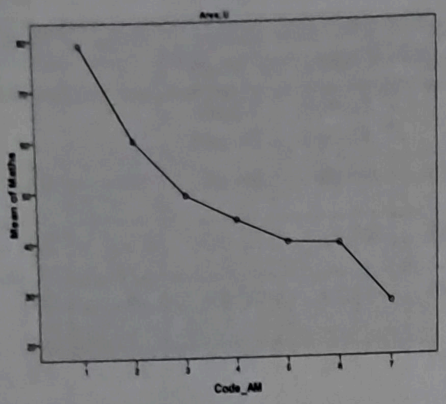

Figure 3. Means Plot of the Urban Students

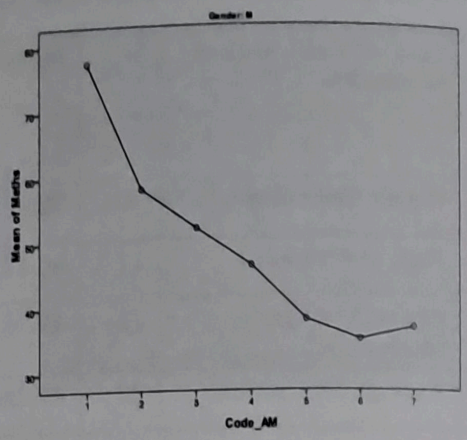

Figure 4. Means Plot of the Male Students

From Table 19, it is found that the F value for the female students is significant at 1% and even at 5% levels (i.e., the hypothesis $H_o5.4$ is rejected at 1% as well as 5% levels). Therefore, the result establishes the fact that there exists significant effect of achievement motivation on mathematics achievement of the female students of the secondary stage.

Findings of the study indicated that the mean of achievement motivation and mathematics achievement scores for the combined, rural, and urban groups as well as the male and female groups are within the average range. It also revealed that there exists significant difference between achievement motivation of rural and urban students, the mean score of urban students being significantly higher than that of the rural students of the secondary stage. But no significant difference was observed between achievement motivation of male and female students of this stage. Similar findings have also been reported by Okoro and Udoh (2014), Ahluwalia (1985), Suman and Umapathy (1997), and Kaur (2013). While Liu and Zhu (2009) and Awan,

Table 18. Descriptive Statistics of the Female Students (Achievement Motivation)

Code	Level of Achievement Motivation	N	Mean	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
1	Highly Motivated	7	72.71	15.79	5.97	58.11	87.32	50	92
2	High Motivation	15	60.73	21.01	5.42	49.10	72.37	29	96
3	Above Average Motivation	36	50.39	14.40	2.40	45.52	55.26	29	80
4	Average Motivation	32	49.28	15.79	2.79	43.59	54.97	25	90
5	Below Average Motivation	45	39.13	11.92	1.78	35.55	42.72	25	77
6	Low Motivation	14	43.00	9.68	2.59	37.41	48.59	27	60
7	Lowest Motivation	2	32.00	9.90	7.00	-56.94	120.94	25	39
Total		151	47.93	16.65	1.36	45.26	50.61	25	96

Table 19. ANOVA of the Female Students

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11364.75	6	1894.13	9.02	**.000**
Within Groups	30226.59	144	209.91		
Total	41591.34	150			

Noureen, and Naz (2011) claimed that gender difference could be noticed between achievement motivation of males and females.

No significant difference existed between mathematics achievement of rural and urban students

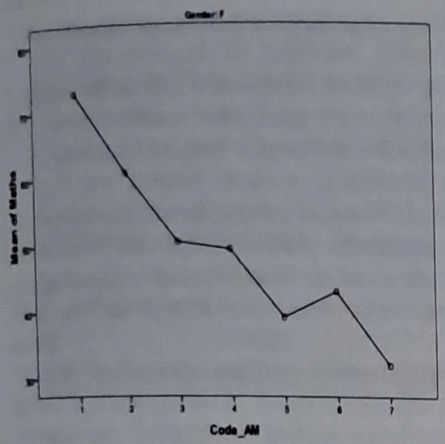

Figure 5. Means Plot of the Female Students

and also between male and female students of this stage. These findings contradict previous researches undertaken by Nematullah and Gulshan (2015) and Alkhateeb (2009) but are in the same line with Ajai and Imoko (2015).The study also revealed that there exists significant effect of achievement motivation on mathematics achievement of the rural and urban as well as the male and female students of this stage.Similar findings could also be noticed in the study carried out by Awan, Noureen, and Naz (2011).

Implications

The present study has immense implications for educational planners, administrators, teachers, parents and above all the society. Teachers must always keep in mind the factor of individual difference among the students and accordingly prepare and modulate their classroom instructions. Students must be made to realize the significance of achievement motivation and its influence on their mathematics achievement. It is recommended that, teachers, educationists and leaders should try to create awareness among parents on the importance of achievement motivation which can subsequently improve the students' achievement in mathematics.

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Received on 11-01-2021
Revised on 18-02-2021
Accepted on 18-01-2021