

A Comparative Study on the Achievement Scores in Science among the Secondary Students of the Tripura Board of Secondary Education

¹Tapan Kumar Ghosh, ²Dr. Ankhi Goon, ³Prof. (Dr.) Shauli Mukherjee, ⁴Dr. Subhas Chandra Bhat

¹Ph.D. Research Scholar, ²Assistant Professor, ³Professor and Director, ⁴Associate Professor

^{1,2,3}Department of Education (School of Education), Adamas University, Barasat – Barrackpore Road, Kolkata, India

⁴In Chemistry (WBES), Government College of Education, Banipur, North 24- Parganas, West Bengal, India

Abstract- Science education is the process of teaching and learning of science to the students. It provides practical knowledge of the subject matter, a broad range of skills in problem solving, logical reasoning and flexible thinking regarding changes around them.

Science teaching is an operational procedure that facilitates students to learn new things, acquire subject knowledge and shape behavior. A teacher plays a vital role in students' achievements in evaluation.

Student's achievement indicates to the extent to which a learner accomplished their short or long-term educational goals. Academic achievements are strongly correlated with individual differences, individual personality, motivation and intelligence.

The purpose of present study is to explore the impact of teaching Science on the achievement scores in science of the secondary students in their Madhyamik Examination. Quantitative methodology is used in this investigation. The samples of three hundred secondary students of both genders are randomly selected from urban and rural areas of study. Six secondary recognized schools are purposively selected from West Tripura district of Tripura. Scores in Science in Madhyamik Examination, 2018 are used as the tools of the study. Collected data are statistically and graphically analyzed.

Results show that the mean achievement scores in science differ significantly between the urban and rural and also between the Boys' and Girls' secondary students. With respect to achievement scores in science significant difference exists between the urban and rural secondary students but there is no significant difference between the boys' and girls' students.

Key words: Achievement, Science teaching, Science Scores, secondary students

Introduction:

The success of education strongly depends on the well designed scientific curriculum, students' friendly text-book and methods of teaching, evaluation process and students' motivation. A good physical infrastructure with audio visual system and a smart classroom with a dedicated and skillful teacher are only able to transact knowledge and make the students educated for productive future life. A successful educative programme is an important factor for the judgment of learning outcomes. All these components of education system are performed by teachers, academic administrators and the Government policy makers with an economic obligation of the state

For effective learning and evaluation teachers play a vital role. For teaching science teacher must be well equipped in language, mathematics, and innovative with creativity in performing experiments. Therefore, an in-depth knowledge of teaching for a science teacher is an urgent requirement.

According to experts' opinion "Teaching is the process of attending to pupil's needs, experiences and feelings, and intervening so that they learn particular things, and go beyond the given". It may be said that Teaching and learning is a process that includes many variables. These variables interact as learners work toward their goals and incorporate new knowledge, behaviors, and skills that add to their range of learning experiences. Teaching science provides students to opportunity to increase their overall understanding of how and why things work around them.

The methods of Science Teaching are Lecture Method, Lecture – cum - Demonstration Method, Laboratory Method, Heuristic Method, Observation Method, Project Method, ICT and Problem-solving Method. Students learn science by actively engaging them in the practices of science, with conducting investigations; sharing ideas with peers; different specialized ways of talking and writing; mathematical, and computer-based modeling; including development of representations of phenomena. It helps the students immensely in understanding the contents of the science subjects.

This study aims to encourage both the students and teachers to improve students' achievement in Science through effective teaching. The author here endeavored to know the achievement scores in science of different areas and

different categories of secondary students of West Tripura district of Tripura with the application of judicious method of teaching science.

Statement of the problem:

This study attempts to find out the effectiveness of teaching Science in the 21st century on the achievement scores in Science of different areas and different categories of secondary students in their Madhyamik Examination. The intense review of literature studies revealed that there was no such work was initiated earlier about the impact of science teaching on the achievement scores in science in Madhyamik Examination of the Tripura Board of Secondary Education, Tripura. So, the author has focused on the topic: **“A Comparative Study on the Achievement Scores in Science among the Secondary Students of the Tripura Board of Secondary Education”**

Variables of the study:

Dependent (Major) Variable: The achievement scores in science in Madhyamik Examination of Tripura Board of Secondary Education are considered as dependent (qualitative) variables.

Independent (categorical) Variable: The teaching methodology in science, gender strata and habitat strata are treated as the independent (categorical) variables.

Research Questions:

RQ1: Do the achievement scores in science of urban and rural secondary students of West Tripura district of Tripura differ significantly from one another in Madhyamik Examination?

RQ2: Do the achievement scores in science of Boys' and Girls' secondary students of West Tripura district of Tripura differ significantly from one another in Madhyamik Examination?

Objectives of the study:

❖ To make a comparative study on the achievement scores in science of Madhyamik Examination between the urban and rural secondary students of West Tripura District.

❖ To make a comparative study on the achievement scores in science of Madhyamik Examination between the Boys' and Girls' secondary students of West Tripura District.

❖ To find the effectiveness of science teaching on the achievement scores in science of the secondary students of West Tripura District in Madhyamik Examination.

Delimitation of the study:

1. The study is delimited only within class-X students' as secondary students of Tripura Board of Secondary Education.

2. This study is also delimited within the West Tripura district of Tripura for time constraints and economic situation.

Hypotheses:

H₀1: There is no significant difference in mean achievement scores in Science of Madhyamik Examination between the urban and rural secondary students of West Tripura District of Tripura.

H₀2: There is no significant difference in mean achievement scores in Science of Madhyamik Examination between the secondary Boys' and Girls' students of West Tripura District of Tripura.

H₀3: There is no significant difference in achievement scores in science of Madhyamik Examination between the urban and rural secondary students of West Tripura District of Tripura.

H₀4: There is no significant difference in achievement scores in science of Madhyamik Examination between the secondary Boys' and Girls' students of West Tripura District of Tripura.

Population: Class - X students (2017 – 2018) of secondary & higher secondary recognized schools of Tripura Board of Secondary Education of West Tripura District of Tripura state are the population of this study.

Samples of the study:

Table: 1

Selected schools of West Tripura district

Selected schools	Number of schools in							
	Urban Area				Rural Area			
	Boys'	Girls'	Co-education	Total	Boys'	Girls'	Co-education	Total
6	1	1	1	3	0	1	2	3

Table: 2

Selected samples of West Tripura District

Total selected samples	Number of Respondents in					
	Urban area			Rural area		
	Boys'	Girls'	Total	Boys'	Girls'	Total
300	77	73	150	40	110	150

The author has to limit the total number of selected samples to three hundred secondary students, taking fifty samples from each of the six selected schools of urban and rural areas of study of both genders for overcoming the practical difficulties and the author also realizes that these number of samples are quite sufficient and satisfactory for the present study.

Tool used: School record of Scores in Science of Madhyamik Examination, 2018 of the Tripura Board of Secondary Education, Tripura, is used as the tool of this study.

Procedure: Maintaining the required formalities and establishing good rapport with the school authorities the author collected the record of scores in Science, as obtained by the respondents in their Madhyamik Examination, 2018, of Tripura Board of Secondary Education, Tripura, from the selected schools. These collected scores in Science of Madhyamik Examination, 2018 are statistically analyzed using MS – Excel and manually with the help of descriptive and inferential statistical procedure.

Results and Discussion: According to the opinion of senior and experienced science teachers and Head of the institutions it is learned that the Lecture- cum- Discussion and Lecture – cum – Demonstration method of teaching Science along with practical classes are generally followed by the experienced teachers in secondary schools of study. The collected data are analyzed statistically for answering the research questions and to justify the Null Hypotheses. Means, Median and Standard Deviations, Skewness and kurtosis and graphs were used in answering the research questions and graphs & t – tests are used to justify the Null Hypotheses.

Data Presentation and Analysis:**Research Question:**

RQ1: Do the achievement scores in science of urban and rural secondary students of West Tripura district of Tripura differ significantly from one another in Madhyamik Examination?

Table: 3-Descriptive statistics of achievement scores in Science

Area of study	No. of Respondents	M	Difference of (M)	Median	SD	Sk	Ku
Urban	150	45.63	3.80	42.42	17.28	0.56	0.281
Rural	150	41.83		38.60	12.88	0.75	0.225

M: Mean of scores

Sk: Skewness of distribution of scores

SD: Standard Deviation of scores

Ku: Kurtosis of distribution of scores

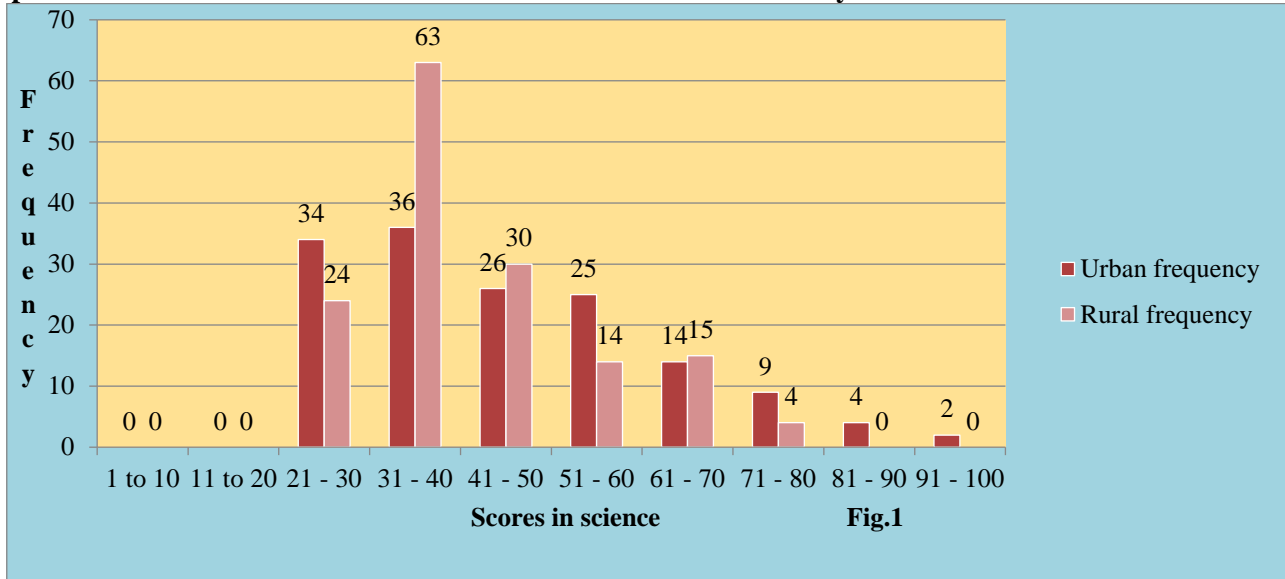
From the Table: 3 of comparison of mean of achievement scores in Science between urban and rural secondary students, it is evident that the achievement of the urban secondary students is better than the achievement of the rural secondary students as evidenced by their mean scores 45.63 and 41.83 respectively. So, it reveals the answer of Research Question: 1, which the scores of urban and rural secondary students of West Tripura district differ significantly from one another in Science scores of Madhyamik Examination.

From these measures it is evident that the distribution of science scores of the sample is positively skewed (0.56) for urban students and positively skewed (0.75) for rural students and with respect to the kurtosis, the distribution is Platykurtic ($Ku > 0.263$) for the urban and Leptokurtic ($Ku < 0.263$) for the rural secondary students of West Tripura district.

So, it may be interpreted that the achievement scores in Science of Madhyamik Examination differ significantly between the urban and rural secondary students of West Tripura district of Tripura.

Graphical Representation of scores in Science

Comparison of scores in science between the urban and rural secondary students



Graphs of **Figure 1** show that the frequency of rural secondary students’ achievement scores in Science at 31 to 40, 41 to 50 and 61 to 70 ranges of scores are higher than the urban secondary students. On the other hand the frequencies of achievement scores of the urban students are remarkably better in Science at other ranges of scores, especially in higher ranges of scores. Hence, it is interpreted that the achievement scores in science of the urban and rural secondary students differ significantly from one another in Madhyamik Examination as conducted by the Tripura Board of Secondary Education.

Research Question:

RQ2: Do the achievement scores in science of Boys’ and Girls’ secondary students of West Tripura district of Tripura differ significantly from one another in Madhyamik Examination?

Table: 4- Descriptive statistics of achievement scores in Science

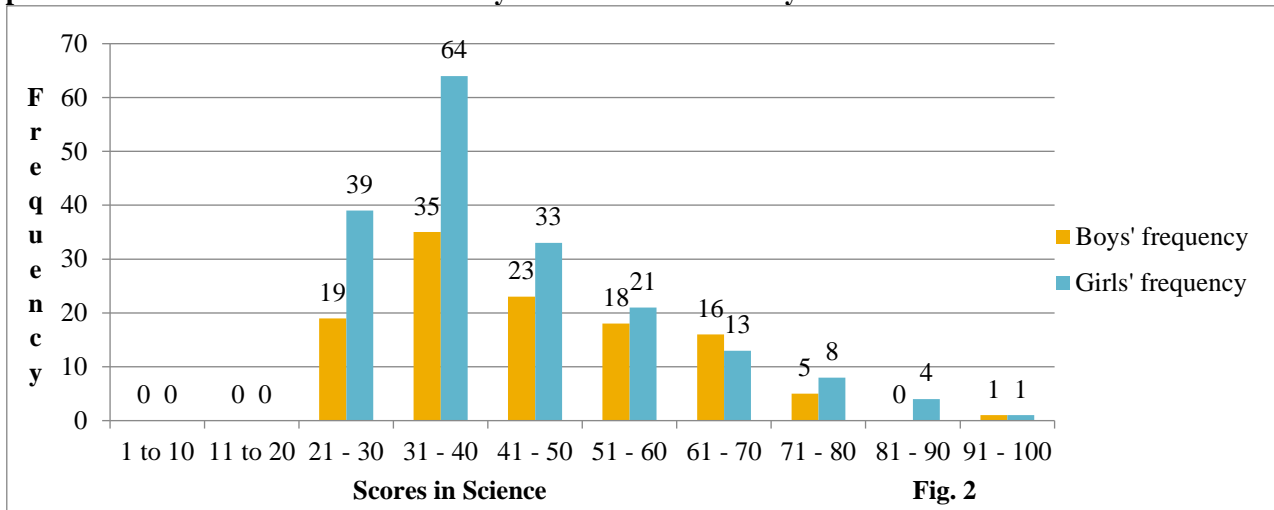
Category of study	No. of Respondents	M	Difference of (M)	Median	SD	Sk	Ku
Boys’	117	45.24	2.47	42.46	14.99	0.56	0.286
Girls’	183	42.77		37.01	12.88	1.11	0.237

From the Table: 4 of comparison of mean of achievement scores in Science between the Boys’ and Girls’ secondary students, it is evident that the achievement of the Boys’ secondary students is better than the achievement of the Girls’ secondary students as evidenced by their mean scores 45.24 and 42.77 respectively. So, it reveals the answer of Research Question: 2, which the scores of Boys’ and Girls’ secondary students of West Tripura district differ significantly from one another in Science scores of Madhyamik Examination.

From these measures it is evident that the distribution of science scores of the sample is positively skewed (0.56) for Boys’ students and positively skewed (1.11) for Girls’ students and with respect to the kurtosis, the distribution is Platykurtic ($Ku > 0.263$) for the Boys’ and Leptokurtic ($Ku < 0.263$) for the Girls’ secondary students of West Tripura district.

So, it may be interpreted that the achievement scores in Science of Madhyamik Examination differ significantly between the Boys’ and Girls’ secondary students of West Tripura district of Tripura.

Comparison of scores in science between Boys' and Girls' secondary student



Graphs of **Figure 2** show that the frequency of Girls' secondary students' achievement scores in Science at 21 to 30, 31 to 40, 41 to 50, 51 to 60, 71 to 80 and 81 to 90 ranges of scores are higher than the Boys' secondary students. On the other hand the frequencies of achievement scores of the Boys' students are remarkably better in Science at other ranges of scores. Here, the frequencies of Girls' achievement scores in science are remarkably better than the Boys' students. Hence, it is interpreted that the achievement scores in science of the Boys' and Girls' secondary students differ significantly from one another in Madhyamik Examination as conduct by the Tripura Board of Secondary Education.

H₀1. There is no significant difference in mean achievement scores in Science of Madhyamik Examination between the urban and rural secondary students of West Tripura District of Tripura.

Comparison of mean achievement scores in science between the urban and rural secondary students:

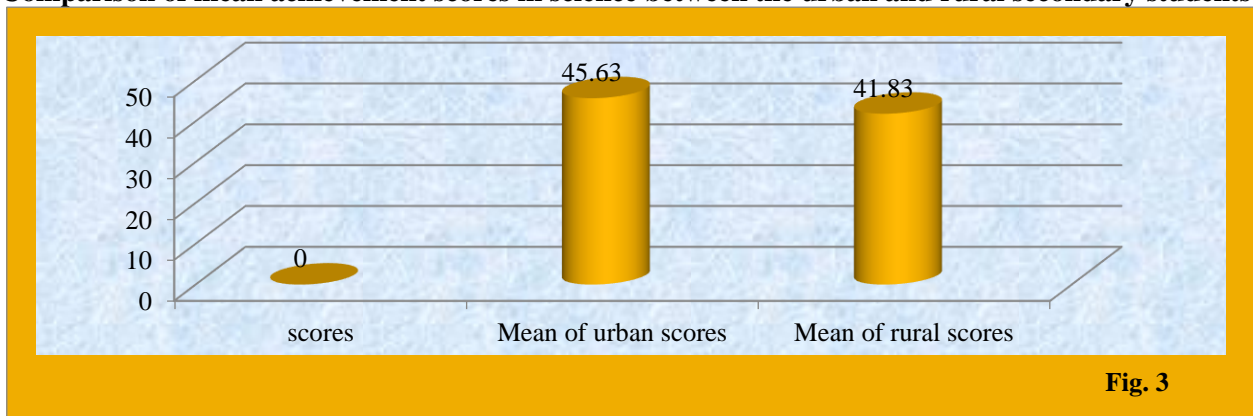


Figure 3 shows that the mean achievement scores in science of the Madhyamik Examination of Tripura Board of Secondary Education of the urban (M = 45.63) and rural (M = 41.83) secondary students differ significantly from one another.

H₀2. There is no significant difference in mean achievement scores in Science of Madhyamik Examination between the Boys' and Girls' secondary students of West Tripura District of Tripura.

Comparison of mean achievement scores in science between the Boys' and Girls' secondary students:

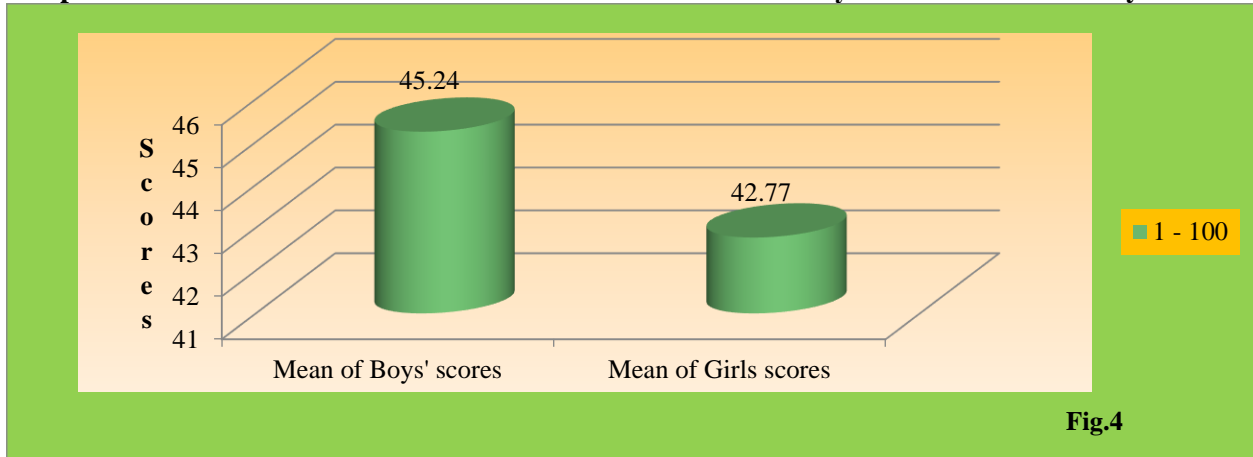


Figure 4 shows that the mean achievement scores in science of the Madhyamik Examination of Tripura Board of Secondary Education of the Boys' (M = 45.24) and Girls' (M = 42.77) secondary students differ significantly from one another.

H₀3. There is no significant difference in achievement scores in science of Madhyamik Examination between the urban and rural secondary students of West Tripura District of Tripura.

Table: 5-Significance of Difference of means between the urban and rural secondary students of West Tripura district of Tripura

Students of	N	M	Mean Difference	SD	SE _D	t	df	Significance at 0.05 level	S / NS
Urban Area	150	45.63	3.80	17.28	1.76	2.16	298	1.97	P < 0.05 S
Rural Area	150	41.83		12.88					

N: No of samples

M: Mean of scores

df: Degrees of freedom

NS: Not Significant

SE_D: Standard Error

SD: Standard Deviation

S: Significant

So, the author can say that there is significant difference in achievement scores in science between the urban and rural secondary students of West Tripura district of Tripura.

H₀4. There is no significant difference in achievement scores in science of Madhyamik Examination between the secondary Boys' and Girls' students of West Tripura District of Tripura.

Table: 6

Significance of Difference of means between the Boys' and Girls' secondary students of West Tripura district of Tripura

Category of Students	N	M	Mean Difference	SD	SE _D	t	df	Significance at 0.05 level	S / NS
Boys'	117	45.24	2.47	14.99	1.80	1.37	298	1.97	P > 0.05 NS
Girls'	183	42.77		15.51					

So, the author can say that there is no significant difference in achievement scores in science between the Boys' and Girls' secondary students of West Tripura district of Tripura.

Discussion: The descriptive survey design and quantitative research method are used for this study. According to the subject experts' opinion the Lecture – cum – Discussion, Lecture – cum – Demonstration and practical in science are normally followed in the schools of study. Statistical analysis and graphical representation reveal that the mean

achievement scores in science of Madhyamik Examination between the urban and rural secondary students and between the Boys' and Girls' secondary students differ significantly. The achievement scores in science differ significantly between the urban and rural secondary students but there is no significant difference in achievement scores in science between the Boys' and Girls' secondary students of West Tripura district of Tripura.

According to the results obtained, it may be said that the hypotheses H_{01} , H_{02} and H_{03} are rejected and H_{04} is retained. The author deems these results due to the difference in teaching science and infrastructural facilities. The hypothesis H_{04} is retained, it may be due to the mixing of urban & rural boys' and urban & rural girls' students.

Major Findings:

- With reference to the mean achievement scores in science the significant difference exist between the urban and rural secondary students of West Tripura district of Tripura.
- With reference to the mean achievement scores in science the significant difference exist between the Boys' and Girls' secondary students of West Tripura district of Tripura.
- With reference to the achievement scores in science the significant difference exist between the urban and rural secondary students of West Tripura district of Tripura. But no such significant difference exists between the Boys' and Girls' secondary students.
- The findings reveal the impact of independent variable on the dependent variables.

Conclusion: From the above findings it is concluded that the academic achievement in science of the secondary urban students is far better than the rural secondary students of West Tripura district of Tripura.

Secondly, it is concluded that the academic achievement in science of the secondary Girls students is remarkably better than the Boys' secondary students of West Tripura district of Tripura.

Recommendations:

- ♣ Activity based curriculum should be emphasized for secondary students. It will help immensely for improvement of academic achievement of the secondary students of West Tripura district of Tripura.
- ♣ Teachers should be encouraged for implementing the Lecture – cum – Demonstration method of science teaching and application of ICT especially towards the low – ability and rural secondary students.

Implications:

- This study will provide the present status of the achievement level in science of the secondary students of West Tripura district of Tripura.
- The present study will assist the science teachers to select the suitable method for teaching science at the next higher level of study depending upon the achievement scores in science of the students.

REFERENCES:

1. Alsop, S., and Watts, M. (2003). Science education and affect, *Int. J. Sci. Educ.* 25, 1043 – 1047. Doi: 10.1080 / 0950069032000052180
2. Cheung, D. (2011). Evaluating student attitude toward chemistry lessons to enhance teaching in secondary school. *Educ. Química* 22, 117–122. doi: 10.1016/s0187-893x(18)30123-x
3. Cakiroglu, J., Capa – Aydin, Y., and Woolfolk Hoy, A. (2012). “Science teaching efficacy beliefs ” in *Second International Handbook of Science Education*. (Eds) B.J. Fraser, K. Tobin, and C. McRobbie 1, 449 -462, (Netherlands: Springer). Doi: 10.1007 / 978 – 1 – 4020 – 9041 -7 -31
4. Kar, D., Saha, B., Mondal. B.C. (2014). Measuring Emotional Intelligence of Secondary School Students in Relation to Gender and Residence: an Empirical Study. *American Journal of Educational Research*. 2014, Vol.2, No .4. 193 – 196
5. Osulale, O. J. (2014). Problems of teaching and learning science in junior secondary schools in Nasarawa State, Nigeria. *Journal of Education and Practice*, 5(34), 109-118.
6. Kapur, R. (2018). Factors influencing the students' academic performance in secondary schools in India. *University Of Delhi*, 575-587.
7. Sharma, H. L., Sarita. (2018). Construction and standardization of an achievement test in science. *IJRAR – International Journal of Research and Analytical Reviews*, 5(3)1037 – 1043.
8. Ghosh, T.K., Biswas, P., Bhat, S.C., (2022). A Study on Teaching Physical Science (Physics and Chemistry) at the Secondary Level of West Bengal Shodh Prabha (UGC Care Listed Journal), Vol: 47, No.4, Oct-Dec, 28 – 37.