

Mathematics achievement of secondary school students in Aizawl West, Mizoram: influence of gender, locale, and parental education

HC Lalneihpuii¹, Dr. Vanlaltanpuii², and Zoramsanga³

¹*M. Ed Student, Institute of Advanced Studies in Education, Mizoram, India*

²*Associate Professor, Institute of Advanced Studies in Education, Mizoram, India*

³*Assistant Professor, Institute of Advanced Studies in Education, Mizoram, India*

Abstract—This study investigated the mathematics achievement of secondary school students in Aizawl West Constituency, Mizoram, with emphasis on gender, locale, and parental educational qualifications. A sample of 291 students was assessed using the standardized Mathematics Achievement Test (MAT-IAKT) developed by Imam and Khatoon. Data were analyzed using descriptive statistics and independent t-tests to examine overall achievement levels and group differences. The findings indicated generally low levels of mathematics achievement across the student population. While gender and locale were not found to be significant factors, parental education demonstrated a notable influence, with students of graduate parents performing better than those of less-educated parents. The study highlights the importance of parental educational background in shaping students' mathematical performance and calls for targeted interventions to support learners from disadvantaged educational contexts.

Index Terms—Mathematics achievement, Mizoram, Locale, Gender, Parental education.

I. INTRODUCTION

Mathematics is more than just numbers and formulas—it's a vital part of how we understand the world and make decisions in everyday lives. From helping us manage finances to enabling breakthroughs in science and technology, mathematics play a key role in human development and progress at every level [1]. It is often considered the backbone of modern education and innovation, providing the foundation for many fields that drive a nation's growth and well-being [2]. The development of mathematical problem solving-skills can differ based on gender [3], parental occupation [4], parental involvement and

geographical region [5]. Mathematics achievement reflects students' proficiency in numerical literacy, problem-solving and mathematical reasoning. It indicates their ability to understand and apply mathematical concepts, perform calculation accurately, and think logically to solve real-world and abstract problems [6], [7]. Standardized assessments and performance evaluations are key tools that educators use to measure academic achievement, providing valuable data to track students' mastery of learning objectives and standards, helping to identify learning gaps and enabling targeted interventions to improve academic outcomes [8], [9]. Although everyone agrees learning mathematics is beneficial, it is vastly considered as one of the difficult and uninteresting subjects [10]. This challenge underscores the need to better understand factors influencing students' mathematics achievement to support their learning and improve outcomes. Despite having a high literacy rate, mathematics achievement test is always a matter of concern since many students has poor performance in mathematics [11]. Accordingly, this study investigates the mathematics achievement of secondary school students in Aizawl West constituency of Mizoram, India encompassing both the urban core and the city outskirts, an area that has been relatively less studied, with particular attention to the variables of gender, locale, and parental educational qualification, so as to provide a comprehensive understanding of the factors shaping students' academic performance.

II. REVIEW OF LITERATURE

Several studies have examined factors influencing students' mathematics achievement. Bichi et al. [12] in Kano, Nigeria, reported generally low achievement in mathematics and found male students outperforming females. Similarly, Oribhabor [13] observed a gender effect favoring males among secondary school students in Bayelsa State, though overall performance was above average. In contrast, Khair et al. [14] in Yemen noted that females achieved better results than males, while Adamu and Garba [15] found no gender difference in mathematics achievement though females showed a more positive attitude. Studies in India also present mixed results: Imam and Singh [16] reported no gender difference, whereas Pandey [17] and Kumari & Singh [18] found boys outperforming girls. Nandhini [19] further highlighted only a moderate level of mathematics achievement among higher secondary students in Chennai.

Parental education has consistently emerged as an important factor. Imam and Singh [16] showed that children of highly educated parents scored significantly better. Similar findings were reported by Kunwar [20] in Nepal and Kundu [21] in West Bengal, indicating that higher parental qualifications positively influence achievement. Studies by Ajayi et al. [22] and Ehiwario et al. [23] in Nigeria also revealed that socio-economic status and parents' occupation significantly affect students' mathematics performance.

Locale-based differences have also been explored. Mondal et al. [24] observed urban-rural gaps in Birbhum District, while Ahmed et al. [25], [26] found that urban students in Assam consistently outperformed rural students. Sonar and Patankar [27] further noted weaker mathematical aptitude among rural students compared to urban counterparts.

Overall, the literature indicates that mathematics achievement has association with gender, parental education, and locale, though findings vary across contexts. These studies provide a comparative basis for the present investigation in Mizoram, where such research remains limited.

III. RESEARCH QUESTION

1. What is the level of mathematics achievement of secondary school students in Aizawl West Constituency?
2. Is there any difference in the level of mathematics achievement of secondary school students with regards to gender?
3. Is there any difference in the level of mathematics achievement of secondary school students in relation to their locale?
4. Is there any difference in the level of mathematics achievement of secondary school students in relation to parental educational qualification?

IV. OBJECTIVE OF THE STUDY

1. To find out the mathematics achievement level of secondary school students in Aizawl West Constituency.
2. To investigate the mathematics achievement level among Secondary School students with regards to gender.
3. To examine the mathematics achievement among secondary school students in relation to their locale.
4. To study the mathematics achievement among secondary school students in relation to parental educational qualification.

V. OPERATIONAL DEFINITION OF THE KEY TERMS

Aizawl West Constituency: In this study, Aizawl West Constituency refers specifically to Aizawl West-I, Aizawl West-II, and Aizawl West-III constituencies of Aizawl, Mizoram, India.

Locale: Locale denotes the place of origin of the students, categorized as urban origin (students from the main city area) and rural origin (students from the outskirts or rural parts of the constituency).

Parental Education: Parental education refers to the educational qualification of the students' father and mother, classified as under-matriculate (below Class X), matriculate (above Class X) and graduate (College and above).

VI. POPULATION OF THE STUDY

The study population comprised 291 Class IX and X students enrolled in government, private, and aided secondary schools of Aizawl West Constituency. These students represent the target group for assessing mathematics achievement in relation to various demographic variables.

VII. METHODOLOGY

For the purpose of collecting primary data in this study on mathematics achievement among secondary school students in Aizawl West Constituency, Mathematics Achievement Test (MAT-IAKT) by Imam and Khatoon [28], a standardized mathematics achievement test was employed. The test included multiple-choice questions that focus problem-solving tasks covering topics such as Algebra, Geometry, Arithmetic, and Statistics. The test was administered according to the standardized procedures recommended by the authors to maintain the reliability of the scores.

In order to determine the mathematics achievement levels of the study population, the test scores were analyzed and classified into seven levels: extremely high, high, above average, average, below average, low, and extremely low, as recommended by tool developer. This categorization reflects students' mathematical proficiency and highlights both strengths and areas needing improvement.

In order to examine variations in mathematics achievement with respect to selected demographic variables such as gender, locale, and parental

education, inferential statistical techniques were applied. The t-test was employed to determine whether significant differences existed between the mean achievement scores of different groups. This statistical method was chosen as it is appropriate for comparing the means of two independent groups and helps to establish whether observed differences in mathematics achievement were statistically significant or due to chance.

All statistical analyses were carried out using standard procedures to ensure accuracy and reliability of the findings. The results derived from the t-test provided insights into the extent to which demographic factors influence mathematics achievement among secondary school students in Aizawl West Constituency.

VIII.RESULT

1. *Level of Mathematics Achievement of secondary school students in Aizawl West Constituency.*

The analysis of the data reveals that among the 291 samples taken, no student was found to have extremely high, high, or above average mathematics achievement. only 1 student (0.34%) achieved an average level of mathematics achievement. Furthermore, 24 students (8.25%) were identified as having below average mathematics achievement, while 95 students (32.65%) fell into the low achievement category. The data also show that 171 students (58.76%) had extremely low mathematics achievement. this finding implies that the majority of the students have extremely low mathematics achievement and only a very small number exhibit even average performance in mathematics

Table 1: Overall mathematics achievement of Aizawl West secondary school students.

Sl. No	Range of z-score	Grade	Level of mathematics achievement	Number of students	Percentage (%)
1	+2.01 and above	A	Extremely High	0	0
2	+1.26 to +2.00	B	High	0	0
3	+0.51 to +1.25	C	Above Average	0	0
4	-0.50 to +0.50	D	Average	1	0.34
5	-0.51 to -1.25	E	Below Average	24	8.25
6	-1.26 to -2.00	F	Low	95	32.65
7	-2.01 and below	G	Extremely Low	171	58.76

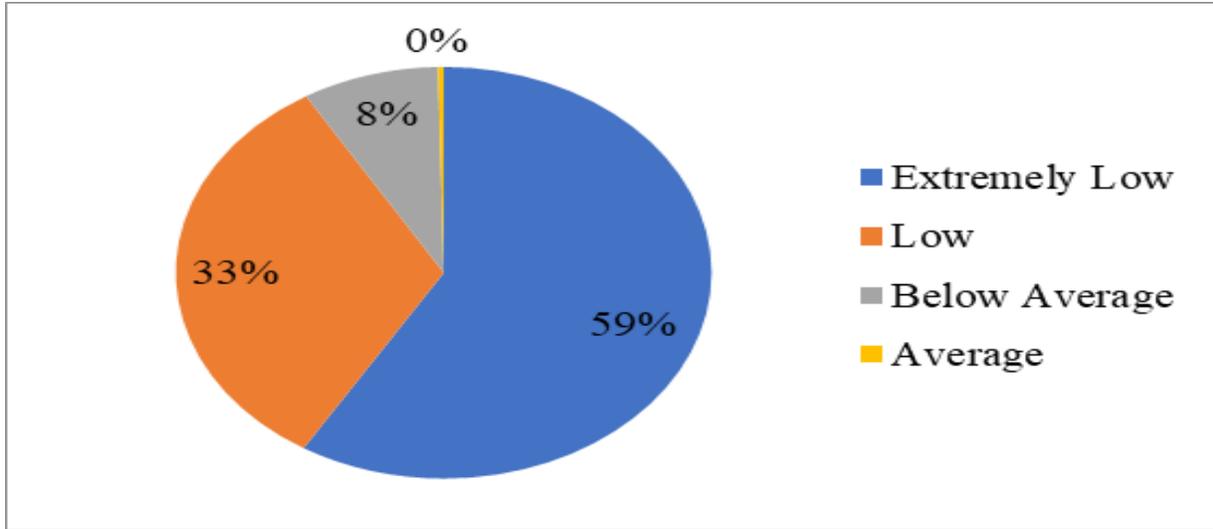


Fig. 1: Graphical pie-chart showing the overall percentage of mathematics achievement of Aizawl West Constituency

2. *Mathematics achievement of secondary school students in Aizawl West Constituency based on gender.*

The results indicated that there was no statistically significant difference between the mean mathematics achievement scores of male and female secondary school students. It was concluded that gender did not significantly influence mathematics achievement among secondary school students in this constituency. This finding implied that being male or female was not a determining factor in students' performance in mathematics.

3. *Mathematics achievement of secondary school students in Aizawl West Constituency based on locale.*

The results indicated that there was no statistically significant difference in the mean mathematics achievement scores between secondary school students from urban and rural backgrounds. It was concluded that students of urban and rural origin in

Aizawl West Constituency did not differ significantly in their mathematics achievement. This finding implied that students' origin, whether urban or rural, was not a determining factor in their performance in mathematics.

4. *Mathematics achievement of secondary school students of Aizawl West Constituency in relation to parental educational qualification.*

4.1. *Father's education*

4.1.1 *Comparison between students with under-matriculate and matriculate father's educational qualification.*

It was found that there was no statistically significant difference in the mean mathematics achievement scores of students based on whether their fathers were under-matriculate or matriculate. This indicated that the father's educational qualification, whether under-matriculate or matriculate, did not significantly influence the mathematics achievement of secondary school students in Aizawl West Constituency.

Table 2: Comparison between students with under-matriculate and matriculate father's educational qualification

Father's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Under-matriculate	125	221	18.52	3.69	1.92	0.05=1.97	Not significant
Matriculate	98		19.69	5.02		0.01=2.59	

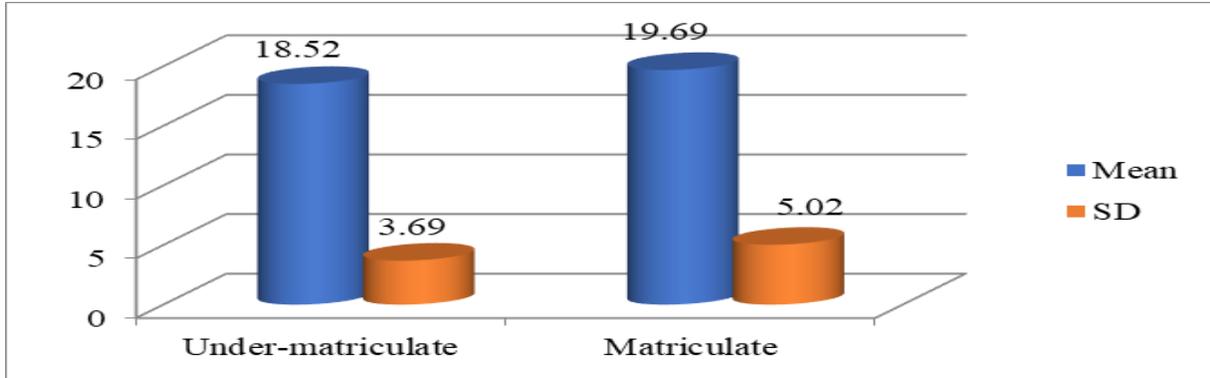


Fig 2: Graphical bar showing comparison between students with under-matriculate and matriculate father's educational qualification.

4.1.2 Comparison between students with matriculate and graduate father's educational qualification

It was found that the calculated t-value of 1.29 was less than the critical values at both the 0.01 level (2.60) and the 0.05 level (1.97). This indicated that

there was no statistically significant difference in the mean mathematics achievement scores of students based on whether their fathers had matriculate or graduate educational qualifications.

Table 3: Comparison between students with matriculate and graduate father's educational qualification

Father's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Matriculate	98	166	19.69	5.02	1.29	0.05=1.97 0.01=2.60	Not significant
Graduate	68		20.68	4.79			

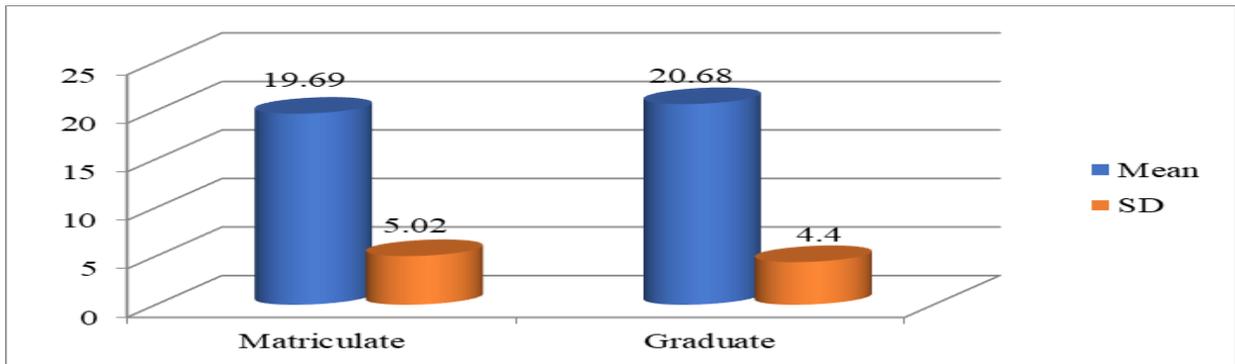


Fig 3: Graphical bar showing comparison between students with matriculate and graduate father's educational qualification

4.1.3 Comparison between students with under-matriculate and graduate father's educational qualification

It was found that the calculated t-value of 3.2 was greater than the critical values at both the 0.01 (2.60) and the 0.05 (1.97) levels of significance. This indicated a statistically significant difference in the

mean mathematics achievement scores of students based on whether their fathers were under-matriculate or graduate. This finding suggested that the father's educational qualification, whether under-matriculate or graduate, significantly influenced the mathematics achievement of secondary school students.

Table 4: Comparison between students with under-matriculate and graduate father's educational qualification.

Father's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Under-matriculate	125	191	18.52	3.69	3.2	0.05=1.97 0.01=2.60	Significant at 0.01
Graduate	68		20.68	4.79			

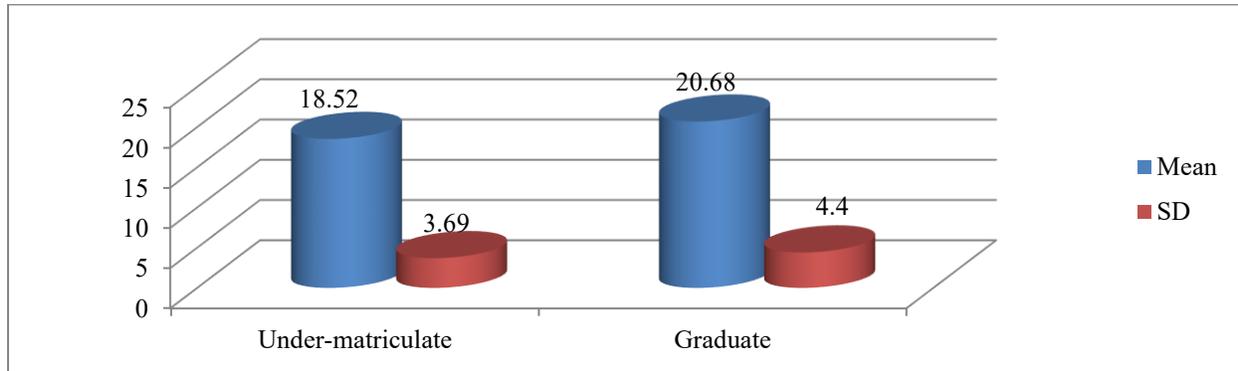


Fig 4: Graphical bar showing comparison between students with under-matriculate and graduate father's educational qualification

4.2. *Mother's education*

4.2.1. *Comparison between students with under-matriculate and matriculate mother's educational qualification*

The analysis revealed that the calculated t-value of 1.86 was smaller than the critical values at both

the 0.01 (2.59) and the 0.05 (1.97) levels of significance. This showed that the mean mathematics achievement scores of students with under-matriculate mothers and those with matriculate mothers did not differ significantly.

Table 5: Comparison between students with under-matriculate and matriculate mother's educational qualification.

Mother's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Under-matriculate	134	236	18.69	4.23	1.86	0.05=1.97 0.01=2.59	Not significant
Matriculate	104		19.77	4.65			

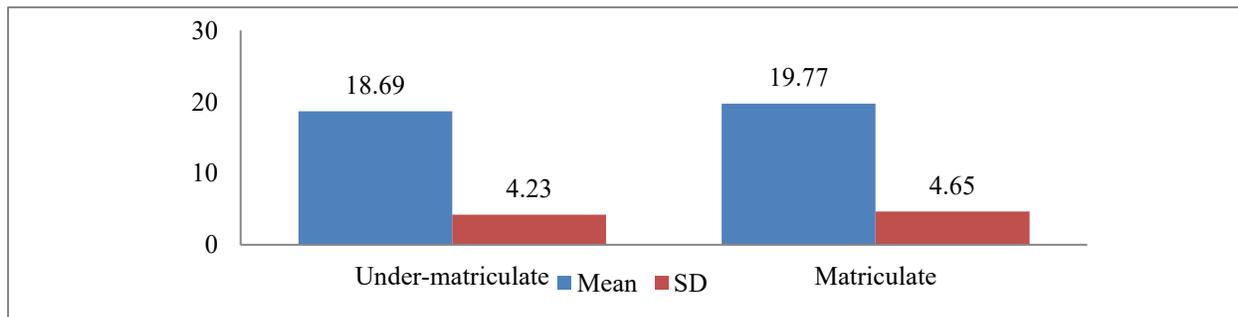


Fig 5: Graphical bar showing comparison between students with under-matriculate and matriculate mother's educational qualification.

4.2.2. Comparison between students with matriculate and graduate mother's educational qualification

The comparison showed that the calculated t-value of 1.15 was smaller than the critical values at both the

0.01 (2.60) and the 0.05 (1.97) levels of significance. This indicated that the mean mathematics achievement scores of students whose mothers were matriculate and those whose mothers were graduates did not differ significantly.

Table 6: Comparison between students with matriculate and graduate mother's educational qualification.

Mother's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Matriculate	104	155	19.77	4.65	1.15	0.05=1.97	Not significant
Graduate	53		20.68	4.64		0.01=2.60	

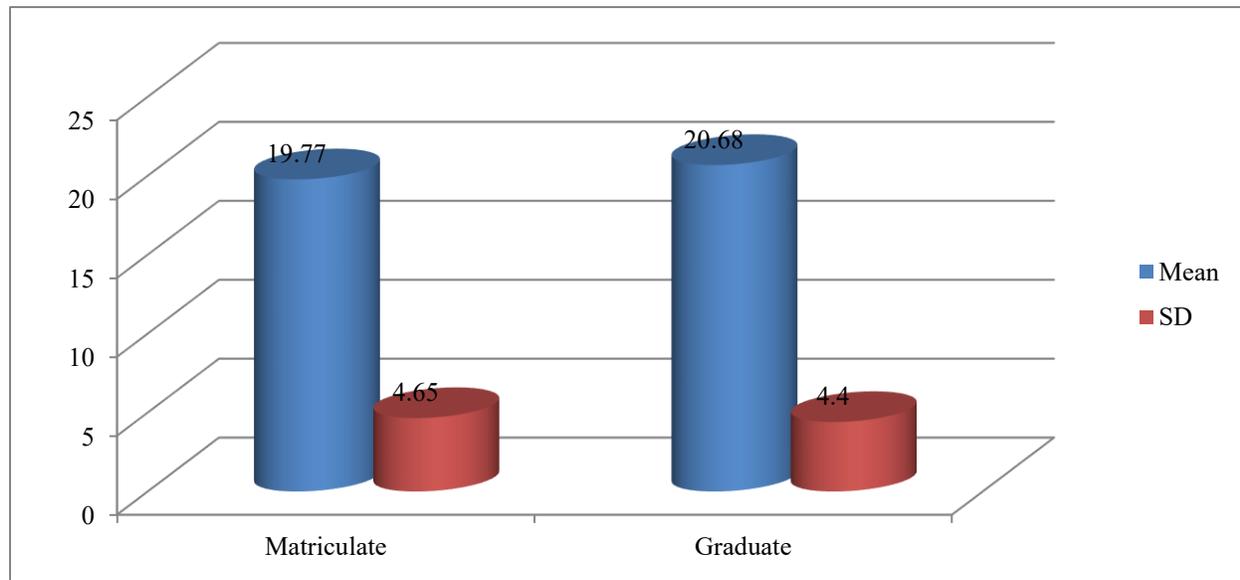


Fig 6: Graphical bar showing comparison between students with matriculate and graduate mother's educational qualification.

4.2.3. Comparison between students with under-matriculate and graduate mother's educational qualification

It was observed that the calculated t-value of 2.74 exceeded the critical value at the 0.01 significance level (2.60). This result indicated a statistically significant difference in the mean mathematics

achievement scores of students whose mothers were under-matriculate and those whose mothers were graduates. The finding suggested that the mother's educational qualification, whether under-matriculate or graduate, had a significant influence on the mathematics achievement of secondary school students in Aizawl West Constituency.

Table 7: Comparison between students with under-matriculate and graduate mother's educational qualification.

Mother's educational qualification	N	df	Mean	SD	t-value	Critical value of t	Significance
Under-matriculate	134	185	18.69	4.23	2.74	0.05=1.97	Significant at 0.01
Graduate	53		20.68	4.64		0.01=2.60	

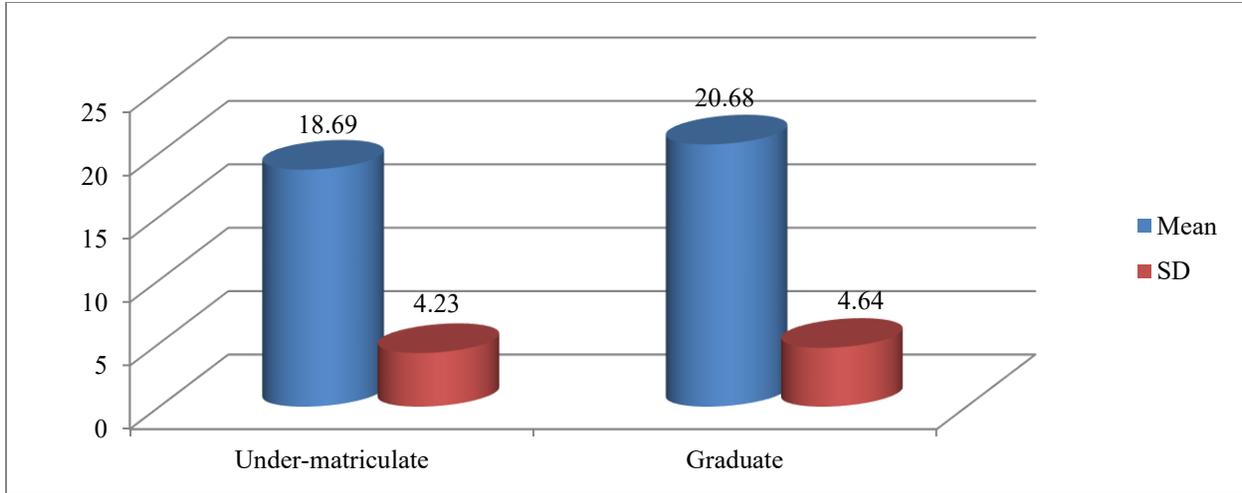


Fig 7: Graphical bar showing comparison between students with under-matriculate and graduate mother's educational qualification.

IX. LIMITATION OF THE STUDY

This study was limited to secondary school students of Aizawl West Constituency, which restricts the generalization of findings to other regions. The sample of 291 students, though useful, may not fully represent the wider population, and only three demographic variables—gender, locale and parental education—were examined, leaving out other influential factors such as socio-economic status, teaching methods, or learning resources. Moreover, the cross-sectional design captures achievement at a single point in time without indicating trends or causality, and reliance on a single standardized test (MAT-IAKT) may not cover the full scope of students' mathematics abilities.

X. CONCLUSION

The present study examined the mathematics achievement of secondary school students in Aizawl West Constituency in relation to achievement levels, gender, locale, and parental educational qualification. The findings revealed that the overall level of mathematics achievement was low, with the majority of students falling in the Extremely Low category and only a negligible proportion reaching the Average level.

With respect to demographic variables, no significant differences were observed in mathematics achievement based on gender or locale, indicating that

these factors did not play a decisive role in students' performance. In contrast, parental education, particularly at higher levels, showed a significant association with mathematics achievement. Students whose fathers and mothers were graduates performed significantly better compared to those whose parents were under-matriculate, highlighting the positive influence of parental educational background on students' academic outcomes.

Overall, the study suggests that while gender and locale do not markedly influence mathematics achievement, parental education—especially when contrasting under-matriculate and graduate levels—emerges as a key factor shaping students' performance. These findings underscore the need for targeted educational support, particularly for students from families with lower parental educational qualifications, to bridge learning gaps and enhance achievement in mathematics.

REFERENCES

- [1] B. M. Ibrahim, M. I. Sani, and I. M. Abdallah, "Development of standardized mathematics achievement test instruments for measuring senior secondary school students' learning outcomes," *Eureka: J. of Educ. Res.*, vol. 3, no. 2, pp. 142–150, Feb. 2025, doi: 10.56773/ejer.v3i2.56.
- [2] M. Y. Mazana, C. S. Montero, and R. O. Casmir, "Investigating Students' Attitude towards

- Learning Mathematics,” *Int Elect J Math Ed*, vol. 14, no. 1, Dec. 2018, doi: 10.29333/iejme/3997.
- [3] I. K. Amalina and T. Vidákovich, “Development and differences in mathematical problem-solving skills: A cross-sectional study of differences in demographic backgrounds,” *Heliyon*, vol. 9, no. 5, p. e16366, May 2023, doi: 10.1016/j.heliyon.2023.e16366.
- [4] D. L. Ngente, V. Lalthanpuii, L. Khiangte, L. Ralte, and C. Lalsangpuii, “A comparative study of high school students in aizawl city in relation to their achievement in mathematics subject,” vol. 11, no. 2, 2023.
- [5] X. Wang and Y. Wei, “The influence of parental involvement on students’ math performance: a meta-analysis,” *Front. Psychol.*, vol. 15, Dec. 2024, doi: 10.3389/fpsyg.2024.1463359.
- [6] F. Blume, T. Dresler, C. Gawrilow, A.-C. Ehliis, R. Goellner, and K. Moeller, “Examining the relevance of basic numerical skills for mathematical achievement in secondary school using a within-task assessment approach,” *Acta Psychologica*, vol. 215, p. 103289, Apr. 2021, doi: 10.1016/j.actpsy.2021.103289.
- [7] B. Sinaga, J. Sitorus, and T. Situmeang, “The influence of students’ problem-solving understanding and results of students’ mathematics learning,” *Front. Educ.*, vol. 8, Feb. 2023, doi: 10.3389/educ.2023.1088556.
- [8] B. Gogoi and D. S. Bhuyan, “Construction and standardization of an achievement test in mathematics and english grammar for class ix students,” vol. 11, no. 7, 2023.
- [9] K. Kadir, “Students’ Mathematics Achievement Based on Performance Assessment through Problem Solving-Posing and Metacognition Level,” vol. 15, no. 3, 2023.
- [10] I. M. Tahir and N. M. A. Bakar, “Influence of Demographic Factors on Students’ Beliefs in Learning Mathematics,” *IES*, vol. 2, no. 3, p. p120, July 2009, doi: 10.5539/ies.v2n3p120.
- [11] L. Nunchanga, “A Study of Relationship Between Academic Achievement in Mathematics and Mathematical Aptitude of Secondary School Students of Aizawl,” *EATP*, pp. 1375–1381, Sept. 2024, doi: 10.53555/kuey.v30i11.9453.
- [12] A. A. Bichi, A. H. Suleiman, and H. Ali, “Students’ achievement in mathematics: Analysing the influence of gender and school nature,” *CERJ*, vol. 9, no. 3, pp. 50–56, Sept. 2019, doi: 10.18844/cerj.v9i3.4293.
- [13] C. B. Oribhabor, “The Influence of Gender on Mathematics Achievement of Secondary School Students in Bayelsa State,” *AJOSIE*, vol. 14, no. 2, pp. 196–206, 2019.
- [14] T. M. Khair, A. M. Khairani, and T. A. Elrofai, “Level of Students’ Achievement in Mathematics at the End of Elementary Education in Yemen, Online Submission, 2012,” *UCER-A*, vol. 6, no. 5, pp. 588–593, 2012.
- [15] G. S. Adamu and I. M. Garba, “Investigation into the Gender Difference of Attitude and Achievement in Engineering Mathematics,” *IJARBSS*, vol. 8, no. 11, p. Pages 161-167, Nov. 2018, doi: 10.6007/IJARBSS/v8-i11/4892.
- [16] D. A. Imam and G. P. Singh, “Influence of Gender and Familial Factor’s on Mathematics Achievement of Secondary School Students,” *IJHSSS*, vol. 2, no. 3, pp. 50–57, Nov. 2015.
- [17] B. Pandey, “A study of mathematical achievement of secondary school students,” *IJAR*, vol. 5, no. 12, pp. 1951–1954, Dec. 2017, doi: 10.21474/IJAR01/6165.
- [18] V. Kumari and M. Singh, “Influence of Gender and Parental Education on Students’ Academic Achievement in Mathematics,” *Inq. Teach.*, vol. 5, no. 2, pp. 92–97, Dec. 2018.
- [19] M. Nandhini, “Level of Academic Achievement in Mathematics among Higher Secondary School Students,” *IJIP*, vol. 11, no. 4, pp. 2204–2208, Dec. 2023, doi: 10.25215/1104.205.
- [20] R. Kunwar, “Impact of Parental Education and their Occupation on Mathematics Achievement of Secondary Level Students in Nepal,” *Research Journal*, Jan. 2021, Accessed: Aug. 20, 2025. [Online]. Available: https://www.academia.edu/44987669/Impact_of_Parental_Education_and_their_Occupation_on_Mathematics_Achievement_of_Secondary_Level_Students_in_Nepal
- [21] A. Kundu, “Influence of Gender and Parents Education Level on Mathematics Achievement of Madhyamik Passed Students in South 24 Parganas, West Bengal,” *NCERT, MHRD, Government of India, NEW DELHI*, Jan. 2022, Accessed: Aug. 20, 2025. [Online]. Available: https://www.academia.edu/94997666/Influence_

of_Gender_and_Parents_Education_Level_on_Mathematics_Achievement_of_Madhyamik_Passed_Students_in_South_24_Parganas_West_Bengal

f_relationship_between_mathematics_apptitude_and_achievement_of_secondary_school_students

- [22] K. Ajayi and O. Akinsanya, "Relative Effects of Parents' Occupation, Qualification and Academic Motivation of Wards on Students' Achievement in Senior Secondary School Mathematics in Ogun State," *Journal of Education and Practice*, Jan.2014, Accessed: Aug. 20, 2025. [Online]. Available: https://www.academia.edu/107228402/Relative_Effects_of_Parents_Occupation_Qualification_and_Academic_Motivation_of_Wards_on_Students_Achievement_in_Senior_Secondary_School_Mathematics_in_Ogun_State
- [23] J. C. Ehiwario, S. O. Aghamie, and R. N. Nwaka, "Effect Of Socio-Economic Background On Secondary School Students' Academic Achievements In Mathematics," *Abacus (Math Ed Series)*, vol. 45, no. 1, Dec. 2020.
- [24] S. Mondal, Dr. N. Mondal, and Dr. B. Saha, "Comparative Study of Achievement Difference in Mathematics At Secondary Level In Birbhum District," *IJSR*, vol. 2, no. 6, pp. 149–151, June 2012, doi: 10.15373/22778179/JUNE2013/48.
- [25] D. E. A. L. I. Ahmed and P. Chatterjee, "Academic achievement in mathematics among rural and urban students: A study on secondary and higher secondary level students," *International Journal of Multidisciplinary Research and Development*, Jan. 2020, Accessed: Aug. 20, 2025. [Online]. Available: https://www.academia.edu/97461994/Academic_achievement_in_mathematics_among_rural_and_urban_students_A_study_on_secondary_and_higher_secondary_level_students
- [26] E. A. Ahmed, M. R. Karim, and M. Banerjee, "Rural-urban disparity in students' academic achievement in mathematics in BTR, Assam in the 21st century," *R. G. Sec.*, vol. 14, no. 10, pp. 16454–16472, Oct. 2023, doi: 10.7769/gesec.v14i10.2789.
- [27] Y. V. Sonar and P. S. Patankar, "A study of relationship between mathematics aptitude and achievement of secondary school students," *ISRJ*, vol. 3, no. 5, June 2013, Accessed: Aug. 20, 2025. [Online]. Available: https://www.academia.edu/27999905/A_study_o

- [28] A. Imam and T. Khatoon, *Manual for Mathematics Achievement Test (MAT-IAKT)*. H. P. Bhargava Book House, 2015.