
AN EMPIRICAL COMPARISON OF SUPERVISED MACHINE LEARNING MODELS IN PREDICTING MATHEMATICS PERFORMANCE: A CASE STUDY OF THE 2022/2023 SOMALILAND NATIONAL PRIMARY EXAMINATION RESULTS

Mukhtar Abdi Hassan^{1,*}, Abdisalam Hassan Muse¹, Saralees Nadarajah²

¹*Faculty of Science and Humanities, School of Postgraduate Studies and Research (SPGSR),
Amoud University, Borama 25263, Somalia*

²*Department of Mathematics, University of Manchester, Manchester M13 9PL, UK*

ABSTRACT

This study examined the factors affecting mathematics performance among primary school students in Somaliland using the 2022/2023 Somaliland National Examination results. The analysis revealed a significant decline in mathematical performance, with the failure rate increasing from 51.9% in 2020 to 42.3% in 2023. Regions and districts showed significant variations in mathematics performance, with regions such as Awdal and Maroodi Jeeh having the highest failure rates. District-level variations were also observed, with Sheekh achieving high pass rates of 98.95% compared with lower rates in Borama and Hargeisa. Gender disparities were also evident, with male students having a higher failure rate (67.17%) than that of female students (63.52%). Urban schools had a higher failure rate (67.64%) than did rural schools (45.21%). Public schools had a lower failure rate (62.21%) than private schools did (68.08%). Six machine learning models were used to analyze predictors of mathematics performance, with Naïve Bayes and KNN being the most accurate models, with an accuracy rate of 98.6% and 80.3%, respectively.

Keywords mathematical performance · machine learning · logistic regression · prediction.

References

- [1] Adhikari, D. B., & Aryal, G. N. (2019). Factors Determining Performance of Institutional Schools in Chitwan, Nepal. *Economic Journal of Development Issues*. <https://doi.org/10.3126/ejdi.v25i1-2.25079>
- [2] Askew, M., Hodgen, J., Hossain, S., & Bretscher, N. (2010). *Values and variables: Mathematics education in high-performing countries*. Nuffield Foundation London.
- [3] Aslam, M. (2009). The Relative Effectiveness of Government and Private Schools in Pakistan: Are Girls Worse Off? *Education Economics*. <https://doi.org/10.1080/09645290903142635>
- [4] Brunello, G., & Rocco, L. (2008). Educational Standards in Private and Public Schools*. *The Economic Journal*. <https://doi.org/10.1111/j.1468-0297.2008.02194.x>
- [5] Ding, C. S., Song, K., & Richardson, L. I. (2006). Do Mathematical Gender Differences Continue? A Longitudinal Study of Gender Difference and Excellence in Mathematics Performance in the U.S. *Educational Studies*, 40(3), Article 3. <https://doi.org/10.1080/00131940701301952>

*Corresponding Author's E-mail: mukhtar.hadaafe@amoud.edu.so