

Tactile Atlas of Nigeria: Development of educational cartographic materials about Nigeria for students with visual impairments

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Keywords: Cartography, Generalization, User Testing, Visual Impairment, Accessible Mapping

Abstract:

The global mandate for inclusive education aims to provide all learners, including students with visual impairments, with equitable access to the core curriculum. In Nigeria, the realization of this goal is critically hampered by a profound lack of specialized instructional materials, particularly in subject areas reliant on visual representation, such as geography as noted by Omede (2015). Although tactile maps are now gaining international recognition according to Bleau et al. (2025), Nigeria appears to be lagging on the adoption. Due to the lack of these cartographic resources, visually impaired students are hindered from developing fundamental geographical and spatial knowledge necessary for both academic success and independent mobility (Bleau et al. 2025).

To address these challenges, this ongoing study is a master thesis which focuses on the development and implementation of a Tactile Atlas of Nigeria. Drawing on current trends in tactile mapping, best practices will be identified and adopted to implement the tactile atlas covering key topics of the physical and political geography of Nigeria. A seamless and effective integration of a customized, locally produced tactile atlas into the Nigerian geography curriculum will be achieved through stakeholder engagement, thereby providing nationwide access to essential spatial information. The development is strongly justified by the overwhelming demand, as 92.9% of respondents in a baseline survey, who are students, believe tactile maps would be of great value to their learning, and 100% of respondents are willing to use the maps if they are made available alongside adequate training.



Figure 1. Locally made tactile maps in use at the Government Special School for the Blind, Ikere-Ekiti. Source: Baseline Survey.

The successful deployment of this atlas will bring about significant improvements in the educational landscape for visually impaired students in Nigeria. The primary benefit expected by the respondents in the study is a transition from passive learning to active participation, making geography a dynamic, hands-on experience for them. Ultimately, the atlas is projected to support inclusive teaching, thereby granting visually impaired students' equitable access to complex concepts and enabling them to form concrete concepts of spatial relationships (Jordão et al. 2023).

Following the review of several literatures on the subject, the production techniques identified from these literatures were evaluated and the microcapsule paper/swell paper printing method was chosen due to its availability, efficiency, and cost. Tailoring tactile maps that support blind users depends on the application of the ideal tactile parameters including the braille font sizes, use of textures, and mode of presentation according to Van Altena et al. (2023). Mulder (2024) also highlighted the need for cartographic generalization using GIS tools and provided recommendations for the various elements in a tactile map including the map frame, line thickness, point symbols, scales, textures, and legend. The current atlas in use in Nigerian secondary schools was also reviewed, and topics were selected across various themes relevant for teaching national geography at global, continental, and national scales. Adopting the findings from literature review, testing materials were produced on some general topics and used for the first user experiment which took place at the Grammar School and Secondary School for Students with Visual Impairments, Prague. The aim of this first testing exercise was to evaluate the tactile/tyflo parameters. The testing was carried out with two male, and two female visually impaired students between 16 – 20 years old, having unique kinds of visual impairments, which made it possible to assess the quality of the map parameters from multiple users' perspective. The test was conducted using the within-subject experiment design where each participant observed all testing materials and provided feedback. The participants were also already familiar with braille texts and tactile maps on microcapsule paper. This testing phase ended with quality feedback that addressed the presentation of the maps in terms of textures, line thickness, symbol size, and braille font sizes. The test materials were reviewed taking to consideration the quality feedback received during the first testing phase.

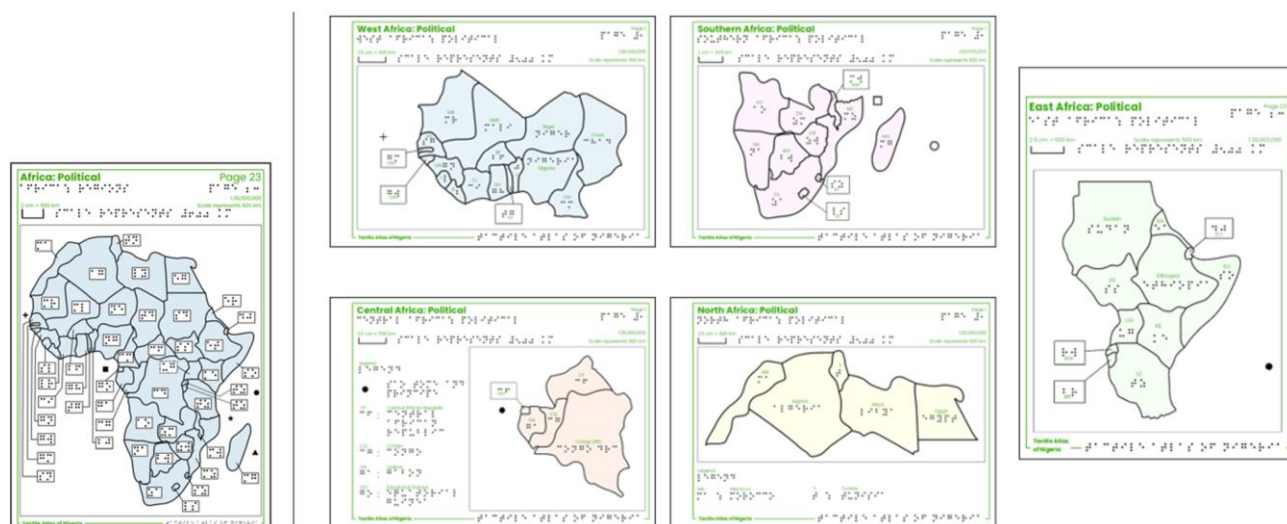


Figure 2. Africa Political map prepared for first user testing (Left) and Africa political map regional subsets produced following user testing and feedback (Right).

The second phase of the user testing was done in April, and prospective users of the final atlas were engaged across selected schools in Nigeria. This phase used the test materials which have been produced by applying the feedback from the first testing session. Following the testing, the maps are currently being improved, and additional maps are being developed. The thesis is expected to be completed by the end of July and the manuscript with the results will be provided.

References

- Bleau, M., Kafle, K., Wang, M., Kabore, S. S., Cueva-Vargas, J. L., & Nemargut, J. P. (2025). International prevalence of tactile map usage and its impact on navigational independence and well-being of people with visual impairments. *Scientific Reports*, 15(1), 27245. <https://doi.org/10.1038/s41598-025-08117-9>
- Mulder, M. (2024). Tactile maps presenting SDG 6 clean water and sanitation. [master's thesis] Palacky University Olomouc. <https://www.geoinformatics.upol.cz/dprace/magisterske/mulder24/>
- Omede, A. A. (2015). The challenges of educating the visually impaired and quality assurance in tertiary institutions of learning in Nigeria. *International Journal of Educational Administration and Policy Studies*, 7(7), 129–133. <https://doi.org/10.5897/IJEAPS2015.0407>
- Jordão, B. G. F., Castellar, S. M. V., Sena, C. C. R. G. D., & Carmo, W. R. D. (2023). The importance of tactile maps in the development of spatial thinking. *Abstracts of the ICA*, 6, 1–2. <https://doi.org/10.5194/ica-abs-6-113-2023>
- Van Altena, V., Rijnberk, D., Kuijter, M., Jansen, J., Min, E., Van Welbergen, A., Visser, T., Van Der Vaart, N., & Nauta, J. (2023). Tailoring Tactile Maps Based on Blind Users' Needs. *Proceedings of the ICA*, 5, 1–7. <https://doi.org/10.5194/ica-proc-5-22-2023>