

1. BACKGROUND & MOTIVATION

Despite the global mandate for inclusive education, visually impaired students in Nigeria face a significant deficit in spatial knowledge acquisition due to a profound scarcity of appropriate instructional materials.

This is caused by:

- Systemic Barriers • Curricula Gap • Production Lag

This research aims to bridge this gap by designing and developing a tactile atlas of Nigeria that is intuitive, and truly accessible.

Keywords: Cartography, Generalization, Tyflo, Visual Impairment, Accessible Mapping

2. AIM & OBJECTIVES

Aim: to develop educational cartographic materials about Nigeria tailored for secondary school students with visual impairments, thereby ensuring equitable access to National Geography knowledge.

Objectives:

- Conduct baseline survey and literature review
- Define geographic themes based on national curriculum and obtain relevant datasets
- Design and produce the pilot atlas
- Conduct user acceptability testing with visually impaired users for design and context
- Implement feedback and document findings

3. STATE OF THE ART

According to the baseline survey and research, there is no existing tactile atlas of Nigeria. Only a few of the participating schools have locally made maps for teaching.

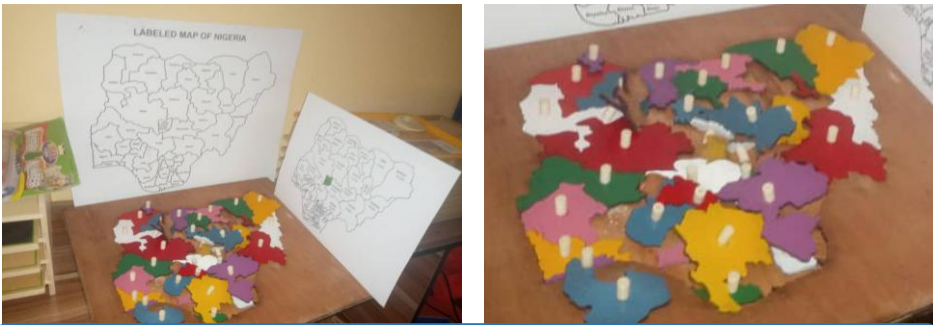


Figure 1. Maps at GSSFB, Ikere-Ekiti, Ekiti State, Nigeria

6. RESULTS

Following a rigorous design and testing process, the prototypes were improved through several design iterations and expert reviews, leading to the establishment of some design and cartographic patterns. The figure below shows what some pages in the atlas look like.



Figure 9. Cover pages of the atlas.

4. METHODOLOGY / WORKFLOW

A research-based, user-centered and iterative approach is followed, combining cartographic design principles with accessibility standards and best practices.

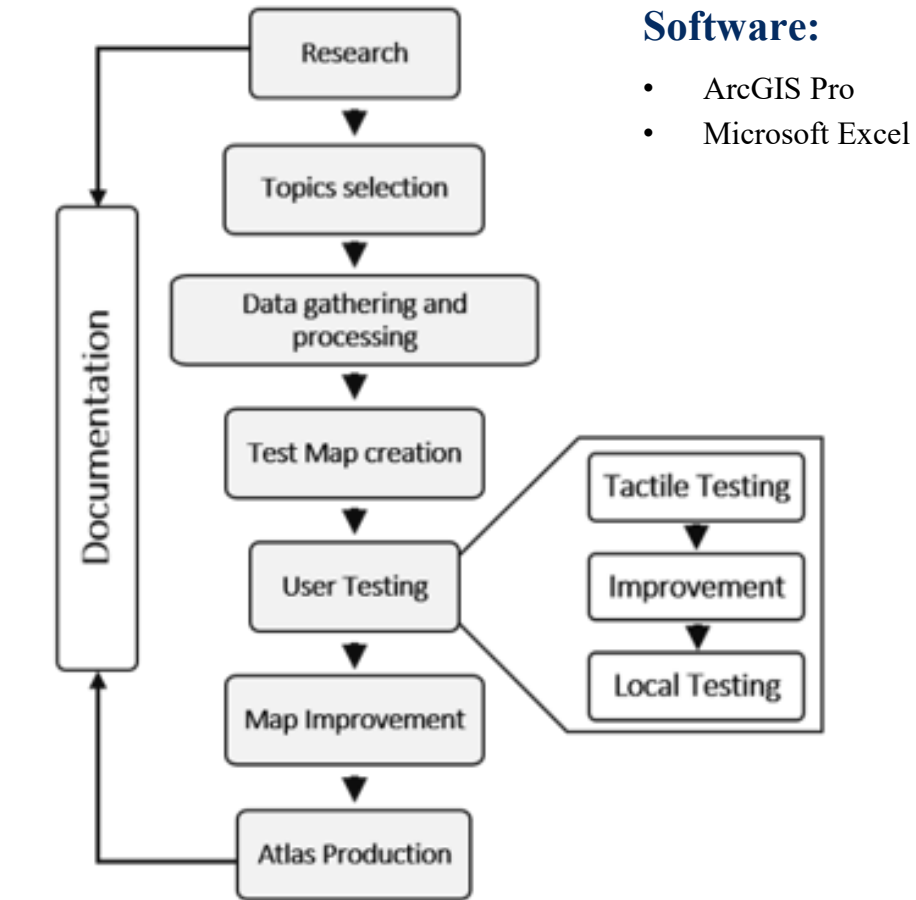
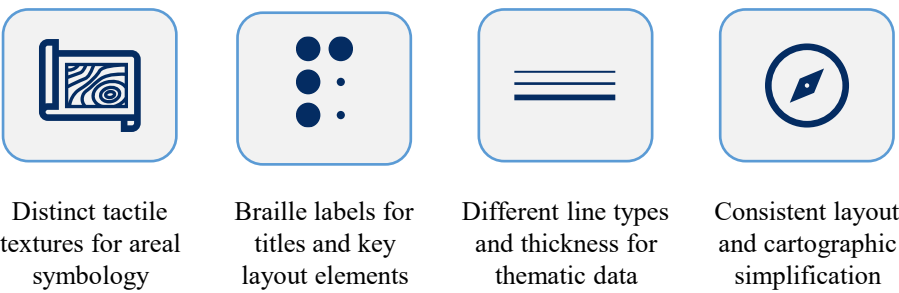


Figure 2. Methodology

5. PRODUCTION AND TESTING

5.1. Design Parameters

Tyflo/Tactile parameters from existing research in tactile cartography and adopted in this work.



5.2. Prototype Maps Developed

Multi-scale prototypes have been designed (one of them below) and produced covering different themes using the Microcapsule / Swell paper method.

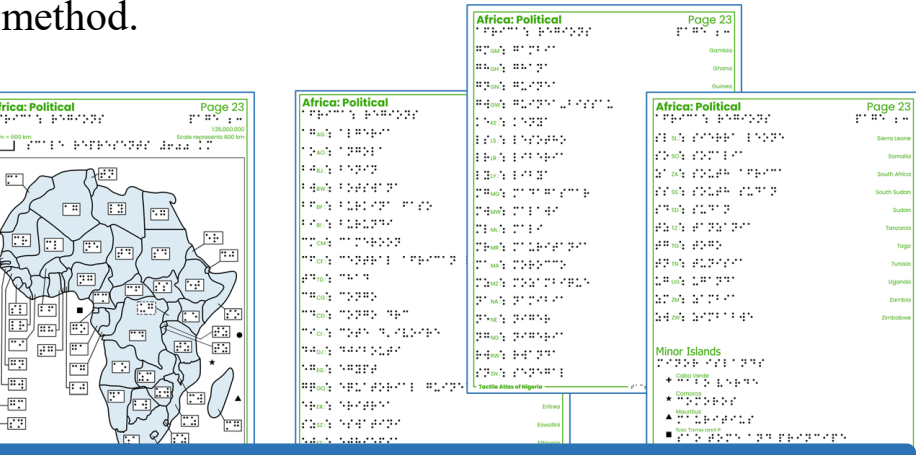


Figure 3. One of the prototypes for phase one testing.

5.3. Prototype production

Multi-scale prototypes covering different themes were designed and produced using the Microcapsule / Swell paper and fuser machine method.



Figure 4. Fuser Machine at KGI

5.4. User testing experiments

User testing experiments were conducted twice: first, to evaluate the tactile parameters of the prototype, and second, to assess the local applicability of the prototypes in Nigeria.

Phase 1: Grammar and Secondary School for the Visually Impaired, Prague

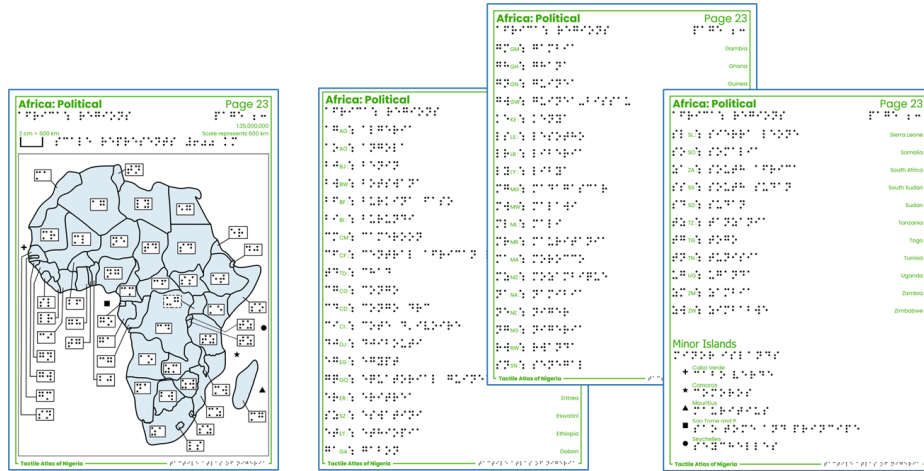


Figure 5. One of the prototypes for phase one testing.



Figure 6. Pictures taken during first user testing session.

Phase 2: Three secondary schools in Nigeria (FCT, Lagos, Ekiti)

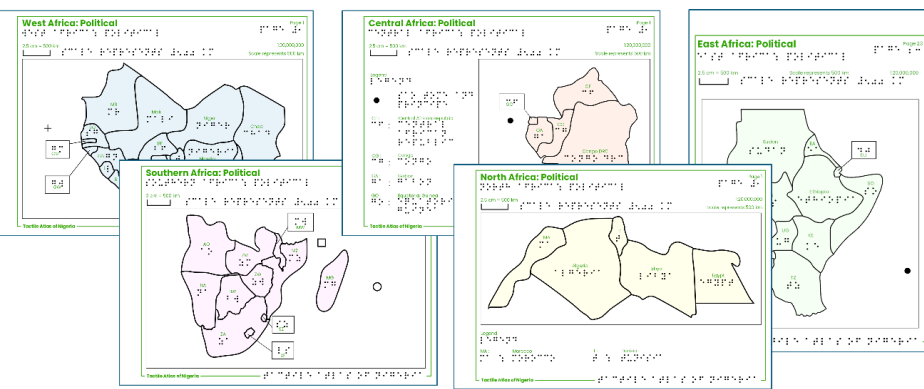


Figure 7. Some improved prototypes for phase two testing.



Figure 8. Pictures taken during second user testing session.

Expert reviews: Reviewed by thesis supervisors and experts in cartography and pedagogy.

The atlas benefited from the thesis supervisor's experience in tactile cartography. Prof. Vit Vozenilek and Dr. Veronica Růžicková from the Pedagogy department also provided advice regarding presentation methods

Educational Impact:

- Shift from passive listening to active, hands-on participation for students with visual impairments.
- Enablement of concrete spatial relationship formation and independent mobility concepts.
- Validated proof-of-concept to encourage institutional support and wider distribution.



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