

Approach to a Scientific Design Method for Programmable Schools towards 'NeuroArchitecture'

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I. EXTENDED ABSTRACT

This project synthesizes an ongoing experimental inquiry, the "Programmable School Research Project", exploring the interaction between the brain, body, built and natural settings to inform affordable but high performance school design for Brazilian rural areas. In combination with biosensors (i.e. EEGs, physiological nanosensors) and environmental sensors (i.e. beacons, SAW, light, humidity, temperature, wind), the impact of school design on pupil outcomes could be measured on-site in both virtual reality visualizations and built settings by means of site-specific advanced design and low-cost prototyping through digital fabrication. Cutting-edge innovations from NBIC approach like algorithmic and generative design, artificial neural networks, rapid prototyping and digital fabrication, scientific visualization and acoustic innovations will allow researchers, pupils and their educational community to experience the consequences of design before it is built by testing their responses to specific learning tasks dealing with classroom attentiveness, privacy, socialization, wayfinding or familiarity.

METHODOLOGY

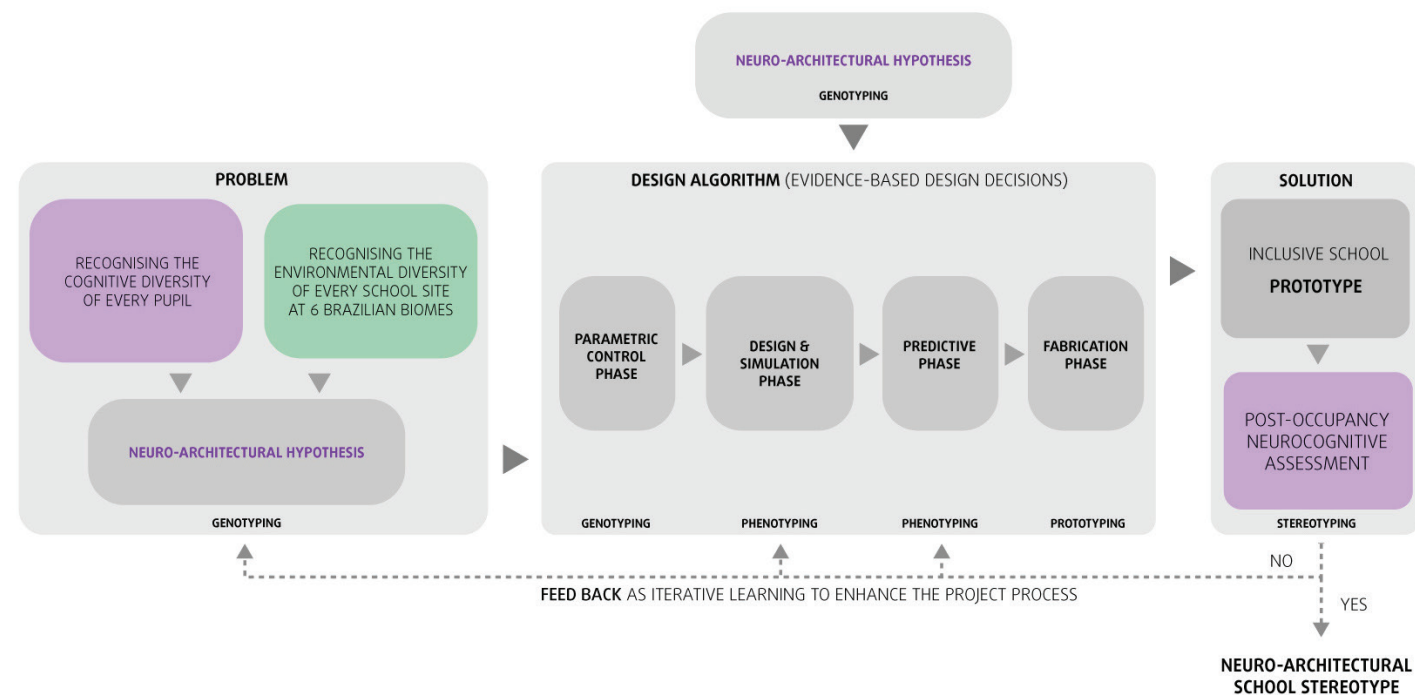


FIGURE 1: DRAFT OF THE METHOD'S DIAGRAM FOR A PROGRAMMABLE SCHOOLS.

To achieve those objectives, this Project approaches and tests a scientific design method for a convergence between neurosciences & architecture, grounded on the logic of semiotics, towards the design of programmable schools throughout Brazilian diverse territories, interacting with the particularities of every biome and every pupil. A so-called 'Programmable Architecture' or 'NeuroArchitecture' would be that emerged from this project method integrating convergent techno-sciences (NBIC: Nano, Bio, Info, Cogno) throughout every architectural process to deliver school facilities: the project (from ideation to simulation through immersive virtual reality), the execution (through digital fabrication & assembling logics) and the use (from interactive performance to management & dismantling).

Relevant bibliography is compiled among Spanish, Portuguese and English literature for the groundings of such an epistemological framework for programmable architecture that could inform a synthetic diagram representing a future school's design, manufacturing and performance scientific methodology and its practical consequences, relating concepts and theoretical approaches to specific, real problems.

FUTURE IMPLICATIONS

Nowadays, immersive technologies are mostly used for virtually experiencing already built architectures; the approach illustrated here takes advantage of the generative features of algorithmic and parametric design and computer graphics, to test a bunch of possible future school designs (the candidate 'offspring') before a single atom is manufactured. In this way, programmable architectures could enable modifying spatial and neurocognitive parameters in real-time to check interdisciplinary correlations.

Customization of school design and educational facilities is attracting great expectations, following neurocognitive high performance levels and understanding architecture as an interpretative, responsive membrane between the human cognition and the natural environment.

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3. AUTHOR BIO

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