## **CIES 2021 Conference**

Learning in Nigeria's Schools: Lessons from In and Out of School Children and a Potential Pedagogical Function

## Outline

- Motivation for the study
- Description of our base data: Nigerian Education Data Survey
- Overview of learning outcomes in Nigeria
- Explaining the concept of the Pedagogical Production Function (PPF)
- Modelling, calibration and simulation of learning profiles in Nigeria using the PPF
- Results of our findings, implications and recommendations

### **Motivation**

- Nigeria's flat-learning curve has been documented in recent years and the important policy questions remain around:
  - The need to understand the depth, dimensions, and drivers of the learning crisis
  - Identification of the most appropriate interventions to address the learning deficits. But, little is known about the drivers of poor learning in Nigeria.
- This paper examined this important policy issues using two tools:
  - Learning profiles: Performance across grade levels to uncover the depth and key dimensions of exclusion.
  - PPF: This gives the expected learning trajectory for a hypothetical student cohort to account for drivers of learning loss and to examine the implications of diverse policy interventions.
- We use a novel dataset, Nigeria Education Survey 2015, which tests for numeracy and literacy competencies among children of primary education age in Nigeria.
- We construct the learning profile covering the in-school and out-of-school children at different ages.

### **Description of our base data** NEDS Dataset



#### Nigerian Education Data Survey (NEDS) is a disaggregated and nationally representative survey on basic education.

- Our focus is on in-school and out-ofschool children from age 5 to 11years (based on official primary school age).
- The analysis covers a total of 51,180 children.
- Numeracy and literacy assessment were aggregated based on a composite index.

Composite Index =  $\begin{pmatrix} 1 & \text{for pass} & \text{if composite score} > 11 \\ 0 & \text{for fail} & \text{if compsite score is} \le 11 \end{pmatrix}$ 

### Expected numeracy and literacy at key grade level

Grade	Minimum numeracy skill based on school curriculum	Minimum literacy skill
		based on school curriculum
Goal of pre-primary: effective transition from home to work		
Pre-primary or	✓ Simple addition of numbers	✓ Reading (words)
at age 5		✓ Pattern making
The goal of primary: to inculcate literacy, numeracy and the ability to communicate effectively		
Primary 1 or at	✓ Addition of numbers 1-10	✓ Identification of letters
age 6	✓ Subtraction of numbers 1 -10	✓ Reading (sentences)
Primary 2 or at	✓ Addition of whole numbers up to 200 with and without carrying	✓ Reading (fluency)
age 7	$\checkmark$ Subtraction of whole numbers up to 200 with and without borrowing	✓ Comprehension (basic)
Primary 3 or at	<ul> <li>Addition of whole numbers with and without carrying</li> </ul>	✓ Comprehension (advance)
age 8	<ul> <li>Subtraction of whole numbers into and without borrowing</li> </ul>	
	$\checkmark$ Word problems on addition and subtraction of whole number	
Primary 4 or at	<ul> <li>Addition of whole numbers including word problems</li> </ul>	✓ Composition
age 9	✓ Subtraction of whole numbers including word problems	✓ Essay writing
Primary 5 or at	<ul> <li>Combination of addition and subtraction</li> </ul>	✓ Grammar & Styles
age 10	<ul> <li>Word problems on addition and subtraction</li> </ul>	✓ Composition
Primary 6 or at	✓ Word problems on addition and subtraction	✓ Grammar
age 11		✓ Composition
		✓ Comprehension (advance)

Goal of Junior Secondary Education: to provide the child with diverse basic knowledge and skill for entrepreneurship and educational advancement

## Learning Profile by Grade

Majority of the children in school are not acquiring expected mastery at the appropriate grade level and age group.



#### Competence in Numeracy by Grade



#### Competence in Literacy by Grade



### Learning Profile: In-school and Out-of-school children

Despite the learning deficits, value addition of education and performance level are still higher for children in school than those out-of-school.



### Learning Profile: Gender Differences in Performance

We found no gender differences in performance, even in northern Nigeria where women have been noted to face higher cultural and economic barriers than men.



### Learning Profile: Other Dimensions of Exclusion

0.00

0.20

0.40

0.60

0.80

1 0.02

0.00

Out of school



0.02

0.20

0.40

0.60

0.80

0.00

0.00

Out of school

9

PPF is a model that simulates the average amount of learning that occurs for children in a cohort with additional schooling.

- The PPF can be adapted to fit different scenarios, to pinpoint which elements of the teaching process contribute most to poor learning, in order to guide investigations and changes.
- The height of the PPF refers to the learning peak from additional schooling
- The width and range show the spread of pupils' skills. The ultimate objective is to have as much intersection as possible between these elements, so more learning can occur.

### The concept of the PPF

Illustration to indicate if instruction and average skill level in a classroom are aligned.

#### PPF

#### **Corresponding Learning Profile**



Source: (Kaffenberger & Pritchett, 2020)

#### Modelling, calibration and simulation of learning profiles

#### Skill distribution function

- The skill distribution function for grade p is assumed as skill distribution for those in grade p-1.
- The density estimates of performance at different grades, indicates a right-skewed distribution, peaking at between a score of 1 and 2.
- This implies that majority of the children reached their peak performance at mean score below 3, correctly answering 3 out of the 13 questions. The performance at lowest entry level, Grade 1, is then set as the baseline skill distribution.



Density Estimates of Performance at Different Grades

#### Modelling, calibration and simulation of learning profiles.

#### PPF

- The corresponding PPF for this illustration has an inverted U shape, denoting a shift in the centre of the distribution from the maximum learning.
- The maximum learning in both cases is below the set pass mark of 11.



### Modelling, calibration and simulation of learning profiles.

#### Illustration of curriculum mismatch

- Here, we match the skill density function and PPF together to demonstrate the learning mismatch in the Nigerian school system.
- The position of the PPF which illustrates the state of curriculum is farther than that of skill distribution.
- The two-curves intersect only marginally for only those at left tail of the skill distribution (high performer).



### Modelling, calibration and simulation of learning profiles.

#### Potential impact of policy interventions

Given the prevailing learning profile, we explore four policy interventions below, and evaluate their impacts on mean test score and pass rate:

- Expanding school access: While this continues to be an important policy priority, given that Nigeria accounts for the highest number of out-of-school children, it is also important to consider/simulate how earning outcomes change when access improves.
- Targeted teaching cross children's skill level: There is a wide disparity in skill level of Nigerian children in a given grade. Teaching however tends to focus on the high performing children. We simulate an alternative teaching approach that targets both low and high performing children.
- Teaching more to more pupils: This relates to considering if increasing the quantity of instruction time provided to children can yield more learning gains.
- Slowing down the pace of curriculum: If curriculum is far ahead of children's skill level, slowing down the curriculum pace is another policy option. The simulation here requires teaching in the school system to be structured to specific skill level, instead of using age-grade structure.

Effect of expanding school access: Performance when there are no dropouts



Score (Out of 13)

#### Effect of targeted teaching across children's skill level



Baseline vs Increased "Width"

#### Effect of additional teaching: Result of teaching more to more pupils



#### Effect of slowing down the pace of curriculum



#### Effect of slowing down the pace of curriculum - cont'd



Baseline vs Targeting at Class Means

### **Our findings** Effect of slowing down the pace of curriculum - cont'd



Score (Out of 13)

### **Implications and Recommendations**

- Two potential solutions: (1) slowing down the pace of the curriculum and instead tailoring the curriculum at a lower level based on assessment of the skill distribution among students and (2) teaching more to pupils.
- The TARL system is one method of school organization that incorporates the idea of centred learning. It can be used to address the potential drop-in pass rates with a curriculum slow down, so that all students can benefit.
- Another effective way to learning recovery based on our analysis is through increasing teaching time per pupil. This can be achieved either through expanding the number of teachers per classroom, or blended learning in which technology supports independent learning with some guidance from teachers.



# Thank You