Adult numeracy within a lifelong learning metric: A case from Senegal in Action Research to measure literacy programme participants’ learning outcomes (RAMAA)

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- RAMAA: Action Research on Measuring Literacy Programme Participants’ Learning Outcomes
- Senegal in RAMAA: Empirical effects of literacy programme on adult skill acquisition
- Discussions: Adult numeracy in a lifelong learning metric
Lifelong learning in SDG 4
SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

% of youths/adults who have achieved at least a minimum level of proficiency in literacy and numeracy skills
Literacy within the Framework of Lifelong Learning

- We live in different life and livelihood contexts
- Literacy learning must be relevant in these diverse contexts
RAMAA (Action Research: Measuring Literacy Programme Participants’ Learning Outcomes)

- RAMAA is focusing on the evaluation of the quality of literacy programmes by measuring learning outcomes.

- OBJECTIVES:
  - provide national policymakers and development partners with reliable and contextualized data to be used to improve the quality of literacy programmes for youth and adults
  - strengthen evidence-based advocacy for youth and adult literacy
  - strengthen national capacities through action research to develop monitoring and evaluation, with a focus on ownership and sustainability.
RAMAA (Action Research: Measuring Literacy Programme Participants’ Learning Outcomes)

5 participating countries of the first phase: Burkina Faso, Mali, Morocco, Niger and Senegal.

RAMAA harmonized skills descriptions and the associated skills (UIL, 2015)
<table>
<thead>
<tr>
<th></th>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>READING</td>
<td>Identify/recognize written words</td>
<td>Read and understand the meaning of a sentence</td>
<td>Read and understand a brief text</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(instruction, rule, etc.)</td>
<td></td>
</tr>
<tr>
<td>WRITING</td>
<td>Spell dictated words or copy words</td>
<td>Write or complete a full sentence conveying</td>
<td>Write a brief text on a given subject</td>
</tr>
<tr>
<td></td>
<td></td>
<td>meaning</td>
<td></td>
</tr>
<tr>
<td>ARITHMETIC</td>
<td>Count objects or currency; write numbers</td>
<td>Compare numbers of objects or amounts of</td>
<td>Perform operations with numbers and money</td>
</tr>
<tr>
<td></td>
<td></td>
<td>currency; more than, less than, equal to, as much as, each, etc.</td>
<td></td>
</tr>
<tr>
<td>MEASURING</td>
<td>Read and write units of time (hour, day, week, etc.), distance and volume (kilometre, metre, kilogramme, etc.)</td>
<td>Situating oneself in time and space (before, during, after, above, inside, outside)</td>
<td>Measuring time and space</td>
</tr>
</tbody>
</table>

Instrumental skills: adequate proficiency in basic aspect of literacy and numeracy (ability to read, write, calculate and communicate in at least one language)

Reference frame: instrumental skills (UIL, 2015)
RAMAA (Action Research: Measuring Literacy Programme Participants’ Learning Outcomes)

Different survey plans and the context-specific instruments

No comparable and standardized measurement tools

Lack of scientific rigor on sampling frame and data quality in the main survey assessment

Senegal: Much clear information on how to collect the data and measure key instrumental skills
A case of Senegal in RAMAA I

Programme-based sampling for three study groups:

1. Target group: adults (aged 15) who completed a literacy programme in late 2013
2. Control group 1: adults (aged 15) who completed a literacy programme between 2011 and 2012
3. Control group 2: adults (aged 15) who have never taken literacy course

Map of RAMAA-Senegal region (Source: Senegal national report)
Domaine : Santé/nutrition  
Situation 3 : Achats à la boutique  

Mise en situation : Tu te rends à la boutique pour acheter du maïs pour ton enfant. Choisis le sachet de maïs.

Consigne 1 :
Item 9. Encadre le sachet de maïs.

---

Brisure de mil (araw)

800F

Sucre

400F

---

Maïs

300F

Farine de mil (sankhal)

500F

---

Consigne 2 :
Item 10. Ecris le prix que tu devras payer pour le maïs.

Prix du maïs : ..............................................................................

---

Scenario: You make yourself to the store to buy corn for your child. Choose the corn bag.

Statement 1:
Item 9. Manages corn bag.

An example item to measure adult numeracy skills to deal with a life situation

Statement 2:
Item 10. Write the price you have to pay for corn.

Corn prices: .................................................................
A case of Senegal in RAMAA I

Measurement tools

- Senegal in RAMAA applied sets of **Item-Response Theory analysis** into measuring an instrumental skill

-> This psychometric score is only available in the pilot sample and described in the national report but has not been included in the main assessment-data yet.

Main tools to measure adult literacy learning outcomes in RAMAA (UIL, 2015)
Preliminary results (ANOVA)

No significant difference among literacy programme participants (target & control 1)

- Treatment (programme participants) vs Control (non-participants) for next analysis

No availability of the psychometric score in the main test data

- Pilot test to be further analyzed

| Instrumental skill acquisition in RAMAA 1 for Senegal |
|-----------------|----------------|----------------|
| Target group    | Control 1      | Control 2      |
| Main test (total=100) | 63.4 ± 56.89   | 19.68 ± 10.33  |
| Pilot test (total=52,33) | 33.34 ± 34.51  | 6.57 ± 5.33   |
Propensity score analysis for RAMAA I

- A quasi-experimental method used to estimate the difference in outcomes between beneficiaries and non-beneficiaries that is attributable to a particular program.
- A propensity score is an estimated probability that a unit might be exposed to the program.
- In the sample, the propensity scores of all units are used to create a comparison group for measuring the program’s impact.

Reduces or eliminates biases in observational studies and estimates the causal effect of a program on an outcome.

As a programme-based survey assessment, the RAMAA 1 data from Senegal can benefit from the propensity score analysis to measure the empirical effect of adult literacy programme on the learning outcome.
1. Estimate the adult’s propensity to take literacy programme

2. Conduct stratification/matching on the estimated propensity scores within stratum

3. Estimate the average treatment effect (ATE) by calculating mean difference of outcome between treated and control groups within each stratum
1. Estimate the adult’s propensity to take literacy programme
1. Estimate the adult’s propensity to take literacy programme

Age and job makes a difference in participating in literacy programme

Adults (younger than 34) with a job are more likely to take literacy programme in Senegal

Classification tree analysis
2. Stratification/matching on the estimated propensity scores

Equivalent in terms of backgrounds
3. Estimate the average treatment effect (ATE)

1. Propensity score stratification

Table. Adult literacy programme effects on instrumental skills within strata

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Participants</th>
<th>Non-participants</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0.645,0.722]</td>
<td>29.80441</td>
<td>3.700101</td>
<td>26.10431</td>
</tr>
<tr>
<td>(0.722,0.74]</td>
<td>34.24062</td>
<td>6.744756</td>
<td>27.49586</td>
</tr>
<tr>
<td>(0.74,0.767]</td>
<td>30.34765</td>
<td>9.044691</td>
<td>21.30296</td>
</tr>
<tr>
<td>(0.767,0.789]</td>
<td>35.46811</td>
<td>7.364963</td>
<td>28.10315</td>
</tr>
<tr>
<td>(0.789,0.851]</td>
<td>38.863</td>
<td>6.645079</td>
<td>32.21792</td>
</tr>
<tr>
<td>Total</td>
<td>33.67848</td>
<td>6.714012</td>
<td>26.96447</td>
</tr>
</tbody>
</table>

Average Treatment Effect: 26.96447*** (t=15.1302, CI .95=23.4480~30.4890)
### 3. Estimate the average treatment effect (ATE)

2. Propensity score matching

<table>
<thead>
<tr>
<th></th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat mean</td>
<td>35.251</td>
</tr>
<tr>
<td>Control mean</td>
<td>5.965</td>
</tr>
<tr>
<td>mean(D = Treat - Control)</td>
<td><strong>29.286</strong></td>
</tr>
<tr>
<td>SD(D)</td>
<td>16.087</td>
</tr>
<tr>
<td>Effect Size</td>
<td>1.821</td>
</tr>
<tr>
<td>Lower 95% Confidence Interval</td>
<td>31.023</td>
</tr>
<tr>
<td>Upper 95% Confidence Interval</td>
<td>27.549</td>
</tr>
<tr>
<td>t (D-bar)</td>
<td>33.171</td>
</tr>
<tr>
<td>df.t</td>
<td>331</td>
</tr>
<tr>
<td>p-value (t-statistic)</td>
<td>0</td>
</tr>
</tbody>
</table>

![Dependent Sample Assessment Plot](image)

- Mean diff. = 29.29
- 95% CI
- t = 33.17
Key results

1. Results of two analytical strategies (ANOVA and PSA) consistently suggest that adults participating in literacy programme in Senegal outperform those who do not participate in instrumental skill assessment.

2. However, inferential analysis (propensity score analysis) finds a smaller difference between two groups compared to descriptive analysis (ANOVA).

3. This implies that difference in instrumental skill acquisition might be more explained by literacy programme participation when controlling variations highly associated with individual backgrounds.

Adult skills gaps need to be considered by wider contexts of life (i.e., adult learning and education)
RAMAA II: Measuring learning outcomes in twelve African countries

Enhancing the measurement tools

- First meeting of the survey design of RAMAA II (February 2017)

Advocacy

- Workshop for graduate students from RAMAA II countries

- A strong collaboration with 8 UNESCO field offices: Abuja, Dakar, Rabat, Yaoundé, Abidjan, Bamako, Chad, Kinshasa, and UIS.

- A solid pool of experts: OECD, the Centre international d'études pédagogiques (CIEP), Statistic Canada, researchers and consultants from Canada and universities of Hamburg, etc.
Q1. How to assess integrative phase of the adult numeracy acquisition in RAMAA II?

A continuum of development of the concept of numeracy showing increased level of sophistication from left to right (from Maguire & O’Donoghue, 2002)
Q2. How to strike a balance between international standard on adult numeracy and national framework?

Q3. What would this imply for RAMAA II assessment? (Pros/Cons)

<table>
<thead>
<tr>
<th>Adult UK</th>
<th>Schools</th>
<th>Vocational</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>England Wales</td>
<td>England Northern Ireland Wales</td>
<td>Scotland</td>
<td>England Northern Ireland (NQF) Wales (COFW)</td>
</tr>
<tr>
<td>Level 2</td>
<td>New GCSE 9 - 4 Old GCSE A* - C</td>
<td>National 5</td>
<td>Level 2</td>
</tr>
<tr>
<td>Level 1</td>
<td>New GCSE 3 - 1 Old GCSE D - G</td>
<td>National 4</td>
<td>Level 1</td>
</tr>
<tr>
<td>Entry Level 3</td>
<td>Expected age 9 to 11</td>
<td>National 3</td>
<td>Level 3</td>
</tr>
<tr>
<td>Entry Level 2</td>
<td>Expected age 7 to 9</td>
<td>National 2</td>
<td>Entry Level</td>
</tr>
<tr>
<td>Entry Level 1</td>
<td>Expected age 5 to 7</td>
<td>National 1</td>
<td>Level 1</td>
</tr>
<tr>
<td>Pre-Entry</td>
<td>Pre-Entry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: [www.nationalnumeracy.org.uk](http://www.nationalnumeracy.org.uk)/ National numeracy
Thank you!

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