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Cost Analysis in Education Interventions

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Why Cost Analysis?

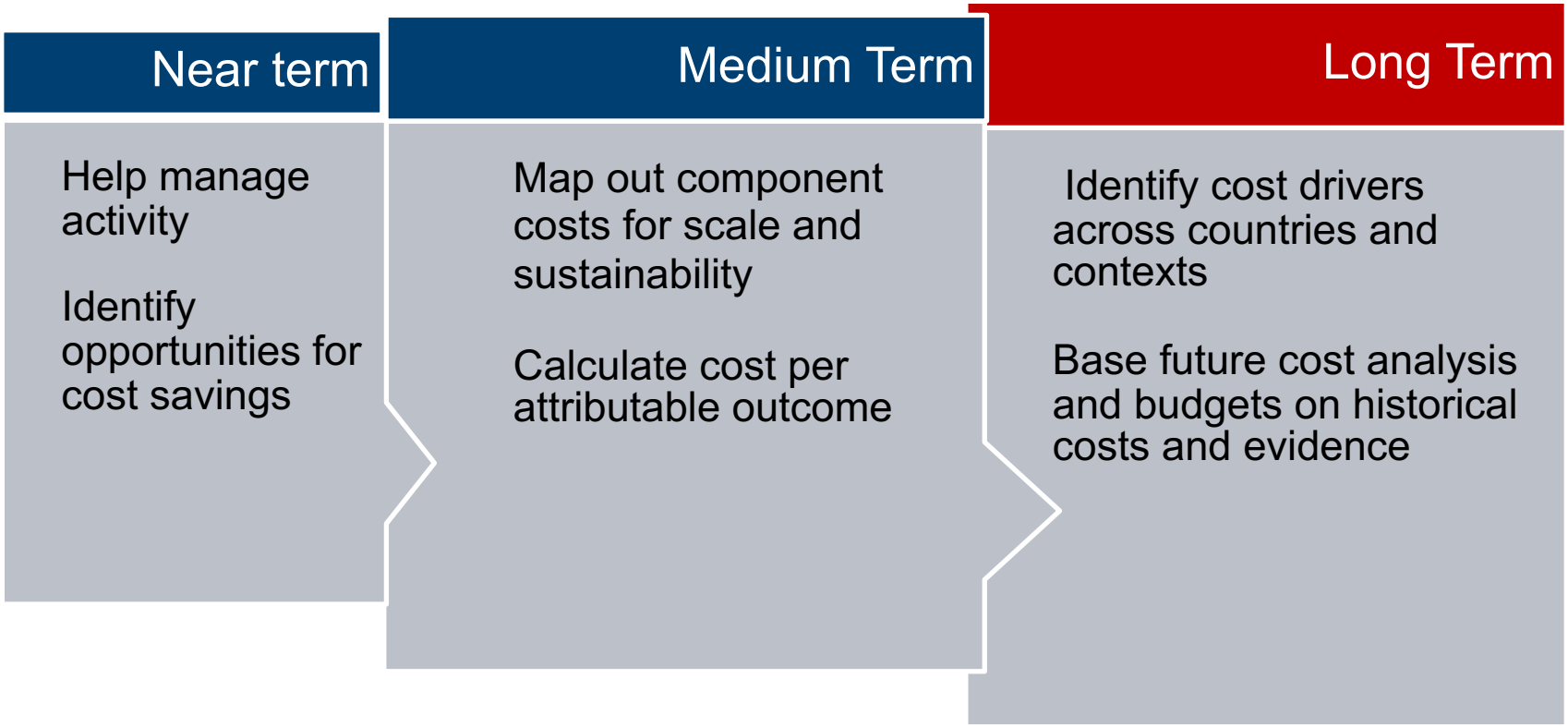
- Profusion of education interventions
- Conflicting information from external education providers
- Lack of data for government providers with limited resources
- Low capacity for cost capture
- BUT without a shared approach to cost analysis there is no basis for comparing interventions

How are decisions made?

Photograph: Alamy Stock Photo

Tendency for interventions to be selected on the basis of what comes out on top

How will cost data help?



Source: Elena Walls (2018)

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Cost effectiveness variation

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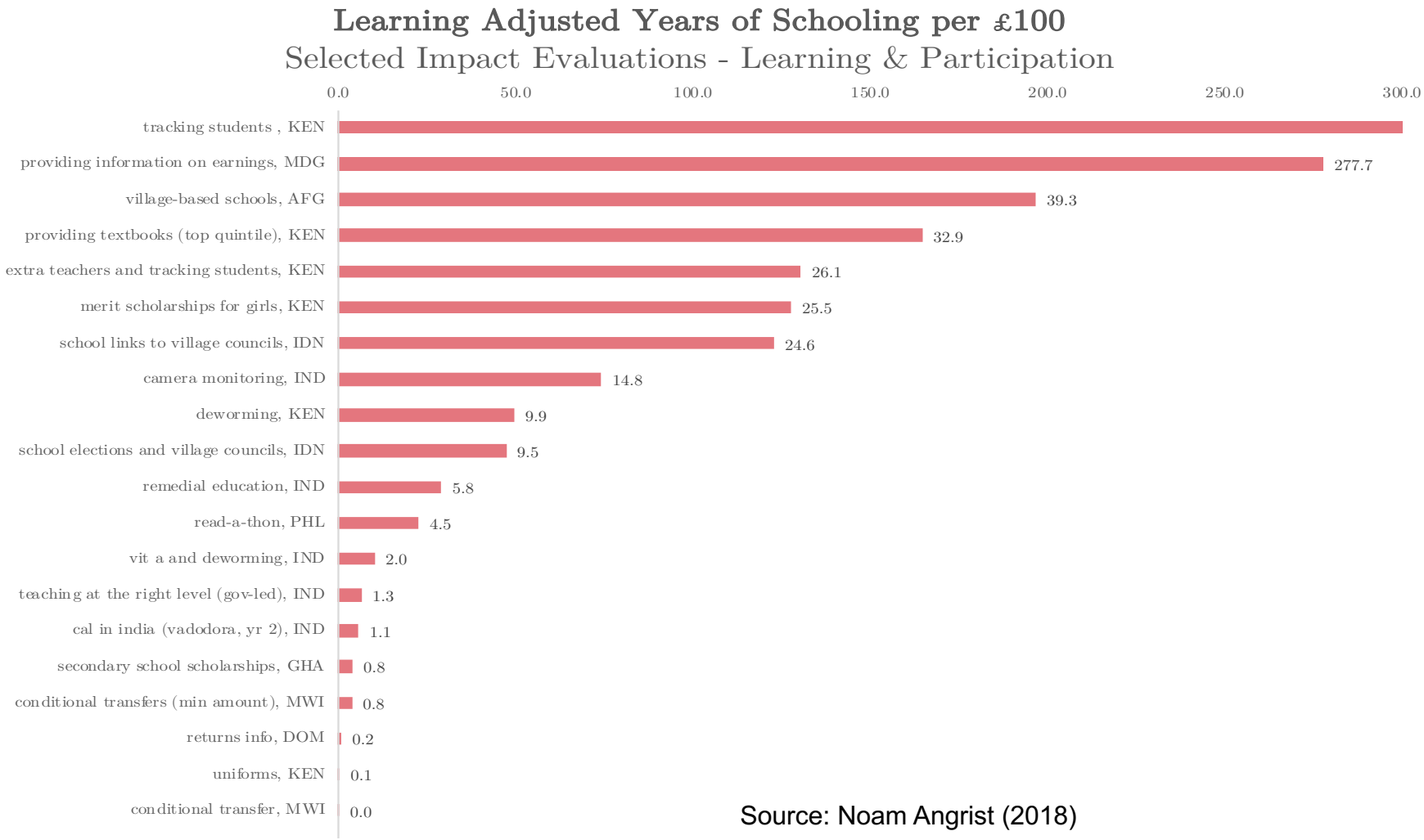

Source: Noam Angrist (2018)

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DFID's approach to cost effectiveness

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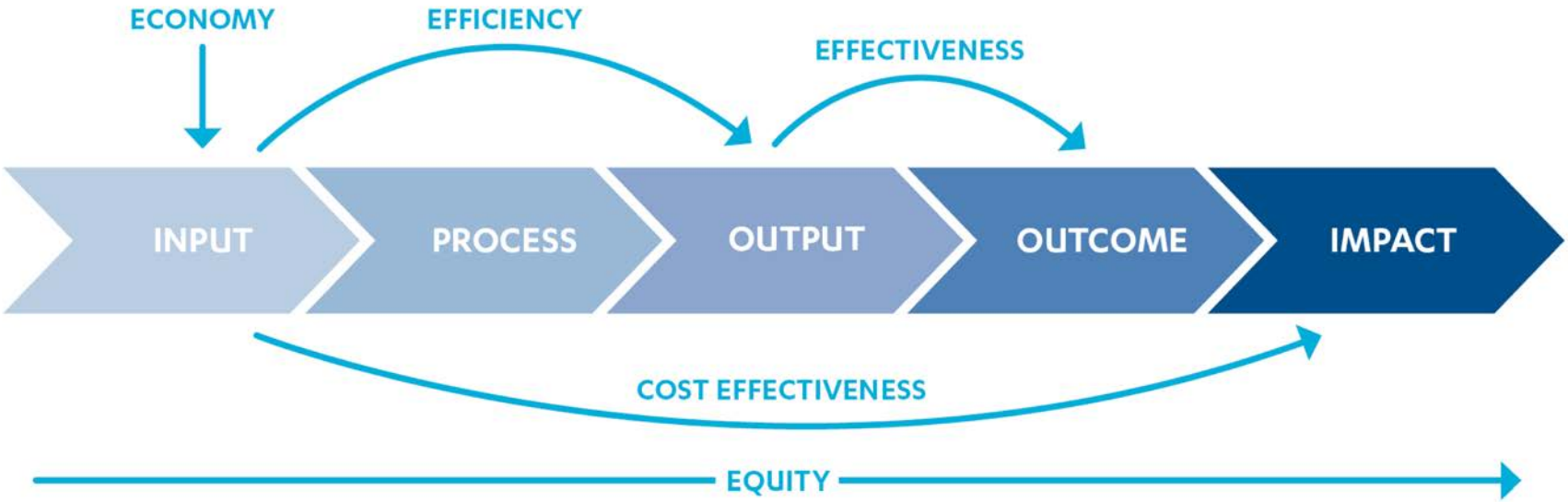

Framework components

Input:
Staff, raw materials, capital.
(eg vaccine and vaccination consumables)

Process:
The methods by which inputs are used.
(eg delivery logistics)

Output:
Results delivered directly by DFID or our agents.
(eg children vaccinated)

Outcome:
We exercise less direct control over outcomes than outputs.
(eg children less susceptible to major childhood diseases)

Impact:
Long-term transformative change.
(eg poverty reduced)

The four Es and cost effectiveness

The four Es and cost effectiveness

Economy:	Efficiency:	Effectiveness:	Equity:	Cost effectiveness:
Are we (or our agents) buying inputs of the appropriate quality at the right price?	How well are we (or our agents) converting inputs into outputs? ('Spending well')	How well are the outputs from an intervention achieving the intended effect? ('Spending wisely')	How fairly are the benefits distributed? To what extent will we reach marginalised groups? ('Spending fairly')	What is the intervention's ultimate impact on poverty reduction, relative to the inputs that we (or our agents) invest in it?

Economy: Spending wisely

- Are inputs purchased at the appropriate quality and price?
- Costs of inputs, such as textbooks or costs for different staff categories, are often not recorded
- Large variations in costs may exist between different country regions or between different suppliers or implementing partners
- Costs shared with partner organisations need to be accounted for
- Fuzzy costs, such as management and administration costs must be included
- Building comparable data would significantly aid donor and governments achieve value for money

Cost categories

1. General management and operations, including donor reporting
2. Assessments and evaluations
3. Pre-service teacher training
4. In-service teacher training
5. Teaching and learning materials
6. Strengthening accountability
7. Private sector engagement
8. Parents/Community involvement
9. Safe schools and infrastructure
10. Grants, scholarships and cash transfers to individuals/families
11. Block grants to organizations
12. Other

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Key principles of cost reporting

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1. The main expenditure categories are standard and should not be re-named or collapsed. Additional sub-categories may be added to answer more nuanced cost analysis questions. Categories should be selected based on the investment's objectives. Where relevant, the expenditure capture should be informed by the MERL design.
2. The entirety of the expenditure must be captured; expenditure must be reported in the category nearest to its intended result.
3. Both expenditure *and* ingredients must be captured. Ingredients include disaggregated salaries and wages, equipment and supplies, rent, travel and per diem, participant costs, grants under contract/award.
4. If the project has development of an intervention as its important component, relevant expenditure must be reported in a dedicated "non-recurrent expenditure" sub-category.
5. The final list of categories must balance the desire for precision with the need to reduce burden of using too many different sub-categories.
6. Estimates of contributions of the government, private actors and description of other donors' contributions must be documented and reported.

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Example of cost reporting worksheet

CATEGORY	# of staff	% FTE	Donated by	Location	Brief description of the contribution
Staff/volunteer time			□ individual(s) □ NGO □ private company		
	# of staff	# of person hours			
Staff/volunteer time in training			□ individual(s) □ NGO □ private company		
	Sq Ft	# days used			
Office Space			□ individual(s) □ NGO □ private company		
	Value in local currency	$$ value			Brief description of the contribution
Venue			□ individual(s) □ NGO □ private company		
Materials/Equipment/Supplies			□ individual(s) □ NGO □ private company		
Transportation			□ individual(s) □ NGO □ private company		
Direct monetary contributions			□ individual(s) □ NGO □ private company		
Other (Please specify here)			□ individual(s) □ NGO □ private company		
Comments:					

Making costs comparable across time and currencies

- **Convert into common currency**, using year specific exchange rate
- **Deflate costs to value in base year prices**, using average inflation rate between base year and the year costs were incurred
- **Compute present value** of these prices
- **Inflate costs to value in the Year of Analysis** using average inflation rate between base year and year of analysis

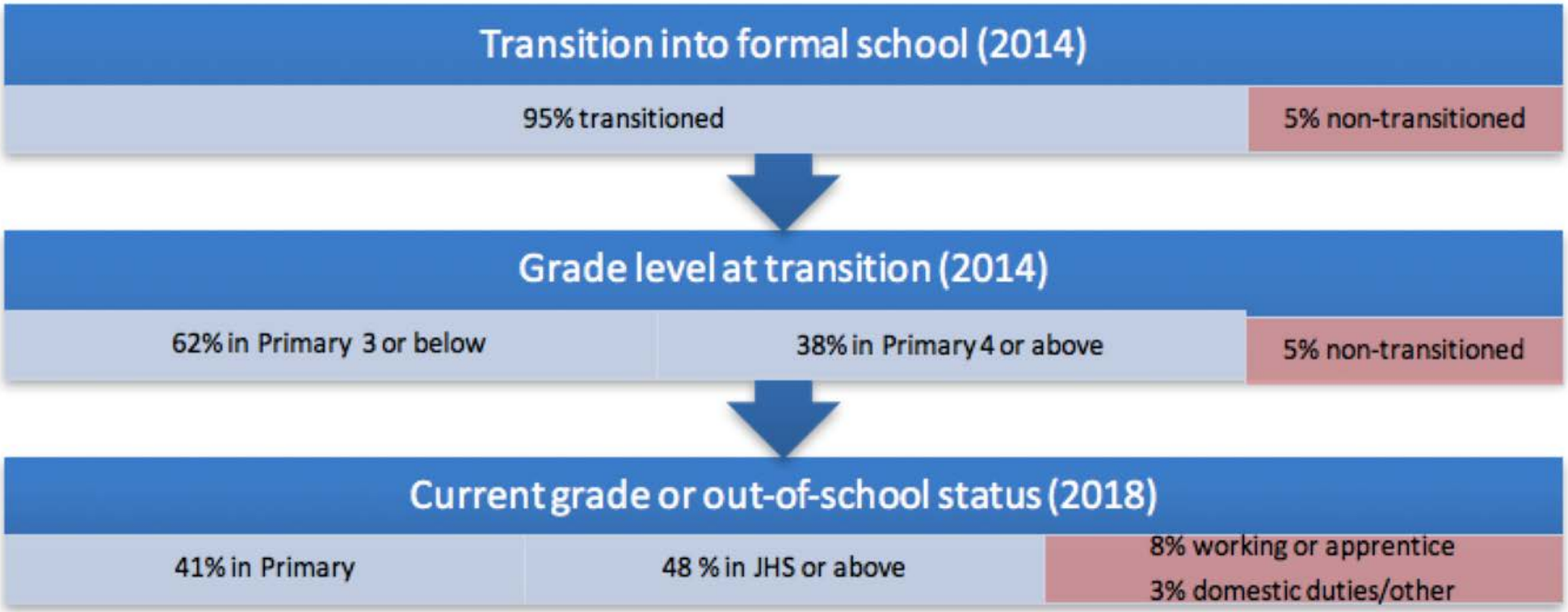
Example: Complimentary Basic Education (CBE) Ghana

A wide view of learning

- Cognitive learning – progress in the classroom
- Emotions
- Experiences
- Relationships
- Hope, fears, expectations
- How you see yourself

- Affected by things outside of the classroom, relationships with family, communities

CBE: Sustained educational trajectories



Example: CBE - Economy

Large variations in the unit costs between different implementing partners

CYCLE 1 EXP per child	AA	AK	GILLBT	IBIS	LINK	Plan	Pronet	SFL	WE	AVERAGE
Inception Phase	22	24	17	34	8	38	1	5	10	14
Training	92	81	42	75	81	66	80	47	36	61
Minimum Operational Activities	67	104	37	52	54	54	25	45	70	52
Capacity Building	11	30	13	39	41	17	12	20	2	20
Monitoring, Evaluation & Lesson Learning	20	25	34	26	42	53	17	6	35	20
Other Costs	82	73	39	85	82	27	65	93	206	87
TOTAL	295	337	183	311	307	256	200	216	359	254
Percentage of average	116%	133%	72%	122%	121%	101%	79%	85%	141%	100%

Source: Amir Jones (2015), costs in Ghanaian Cedi

Efficiency: Spending Well

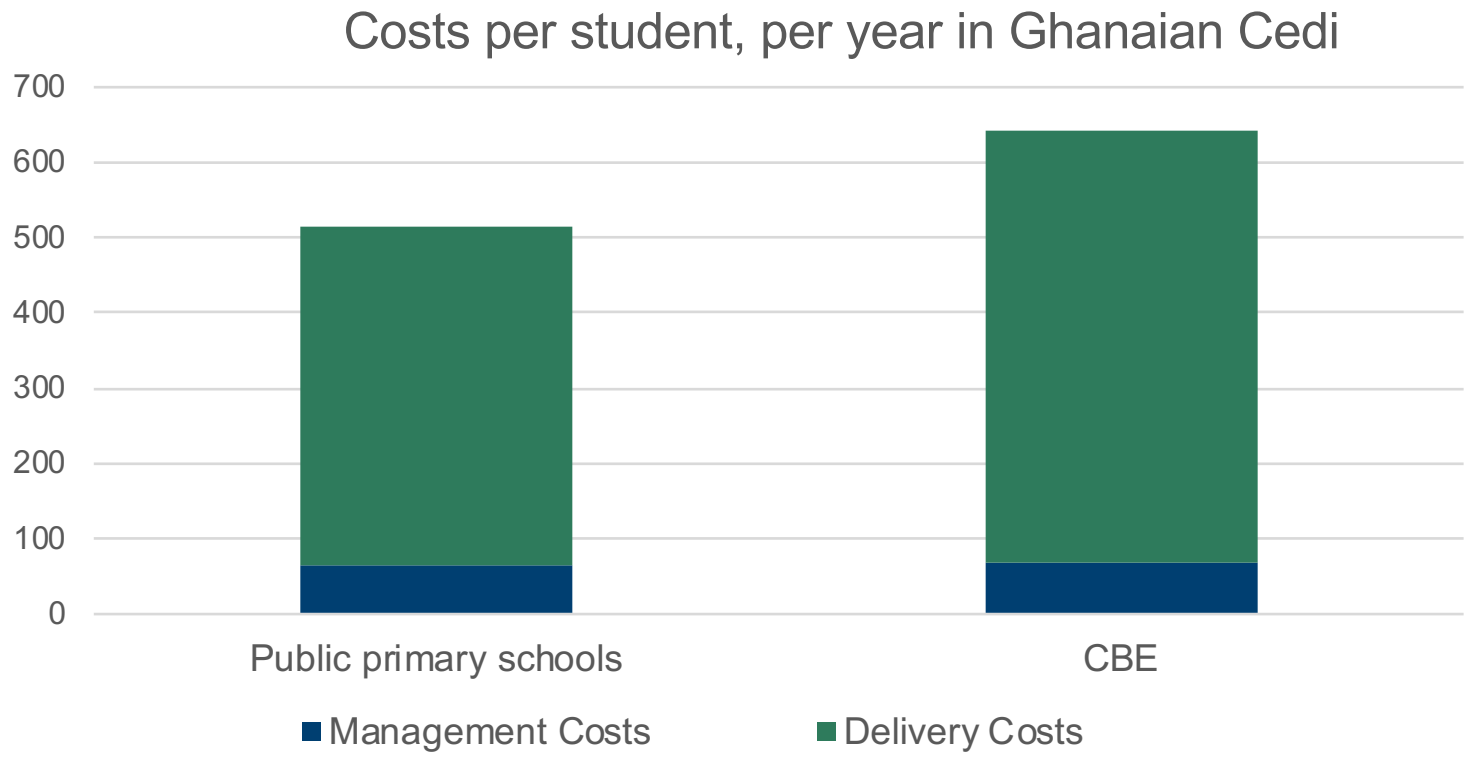
- How well are inputs converted into outputs?
- Outputs may include number of teachers trained, an improved management system or number of students graduating from a programme
- Attribution may be difficult where multiple agencies contribute to outcomes

Cycle	Total Cost	learners enrolled	Cost / learner
Cycle 4	£5,233,599.11	51,030	£102.56
Cycle 5	£2,243,875.76	20,813	£107.81
Combined	£7,677,149.87	71,843	£104.08

Example: Costs per learner enrolled in CBE Ghana

Source: IMC (2018)

Efficiency: CBE Ghana compared with Ghanaian primary schooling



Source: Amir Jones (2015)

Cost Effectiveness: Spending Wisely

- How much of the desired outcome is achieved for the money spent?

- Requires understanding how effective outputs are at producing the desired outcome
- Crucial for making relevant comparisons between different interventions

CBE Ghana – did it achieve its desired outcomes?

Subtask	Baseline Mean Percent Score	Endline Mean Percent Score	Percentage Point Gain
Letter ID	30.9	57.1	26.1
Phonics	29.2	56.2	26.9
Word Reading	20.9	48.9	28.0
Reading Comprehension	20.7	44.8	23.8
Writing	19.9	45.2	25.5
Creative Writing	14.9	38.6	23.7

Source: Ricardo Sabates (2018)

CBE learning outcomes compared to non-CBE students

Scores	CBE(%)	Non-CBE(%)
English Literacy		
Basic score	24.38	22.97
Advanced score	29.36	32.51
Overall score	28.97	30.33
Local language Literacy		
Basic score	24.10	18.74
Advanced score	28.69	20.54
Overall score	29.43	22.86
Numeracy		
Basic score	46.19	45.21
Advanced score	42.51	42.33
Overall score	44.89	44.20

Source: Ricardo Sabates (2018)

Conclusions regarding cost effectiveness of CBE

- Costs per student per year were slightly higher for CBE than for primary schooling
- Learning gains were significant for CBE students when matched against comparable non-CBE students
- Comparable data for learning gains from one year of primary schooling is not available
- Therefore, a direct comparison of cost-effectiveness between primary schooling and CBE is not possible

LAYS: A new measure for learning

- Standard deviations per $100 is a widely used measure of cost effectiveness
- Doesn't capture effectiveness of interventions in terms of **quality *and* quantity**

- **Learning-Adjusted Years of Schooling** introduced in 2018 World Development Report
- Key component of World Bank's Human Capital Index

LAYS: Calculation

- A LAYS “exchange rate” is calculated by comparing test scores with a high-performing benchmark

- E.g. If benchmark is Singapore, Ghana has a LAYS exchange rate of 0.54
  - after one year, Ghanaian students learn 54% of what Singapore students learn

- Intervention effectiveness can be measured in terms of increases in LAYS

Equity: Spending for fairness

- Are those who are most in need receiving benefits?
- Equity should be considered throughout the programme
  - At the design stage
  - In choices at the input, process, output, and outcome levels
  - In evaluation
- Reaching disadvantaged groups may cost more

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Equity: CBE and gender

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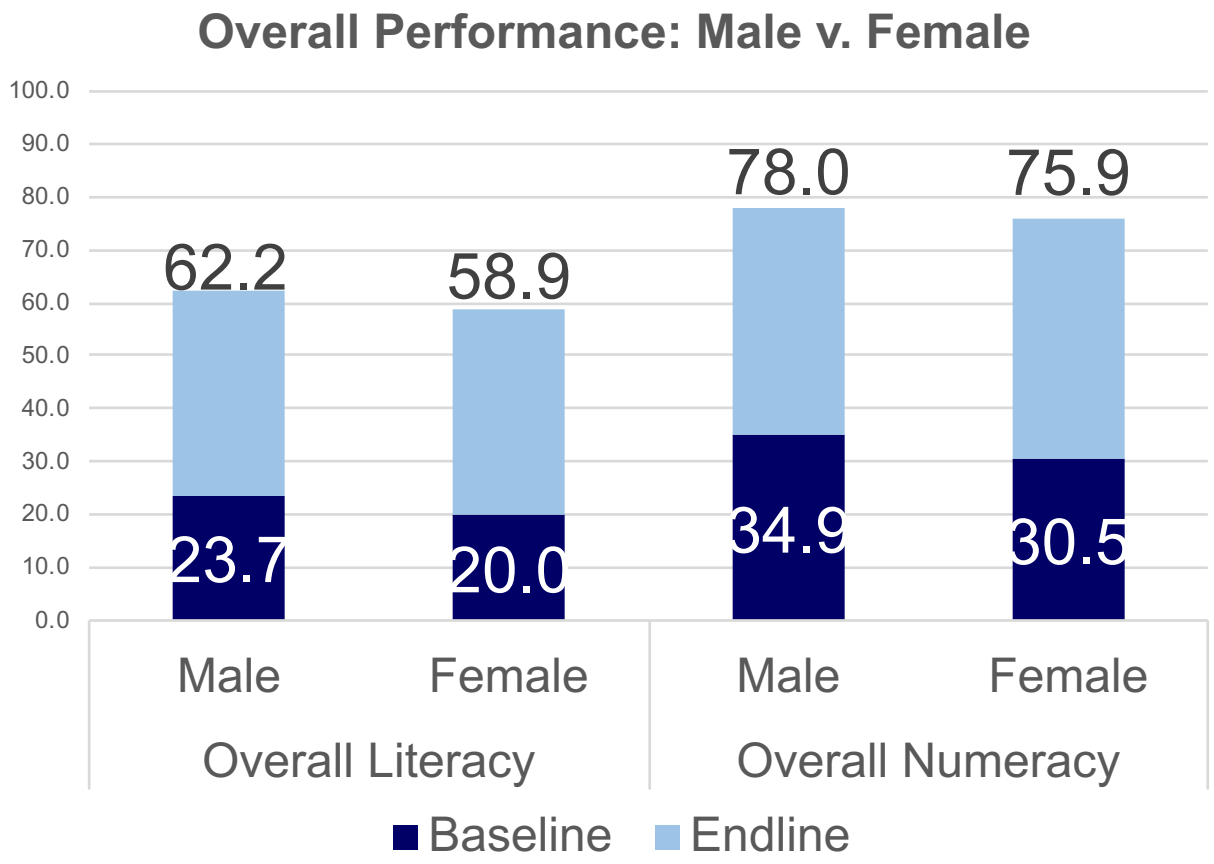
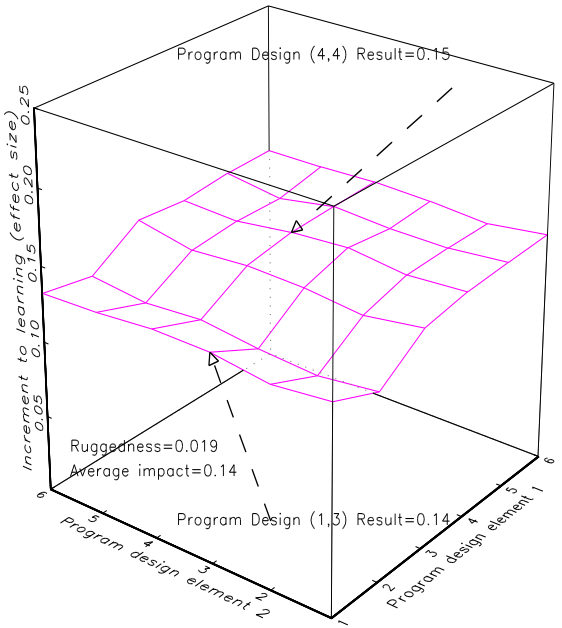
- Male students slightly outperformed females at baseline and endline
- Gain scores were equivalent across the two groups
- Source: Ricardo Sabates (2018)

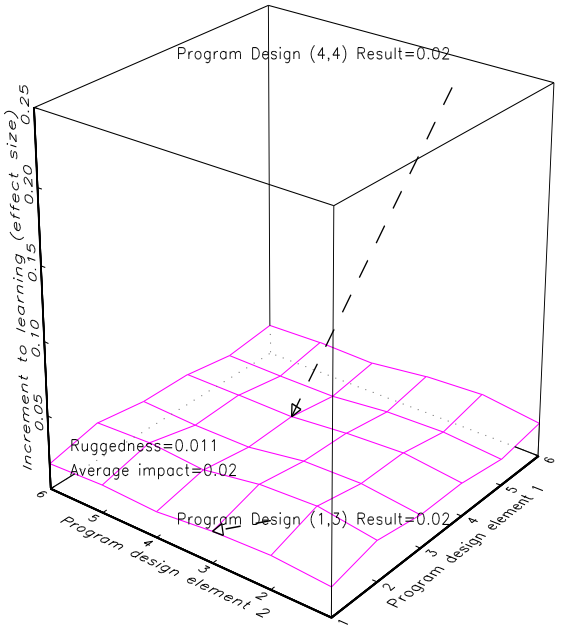


Challenges of context – "Pure" external validity

Response surface in context A—design doesn't matter much, all works



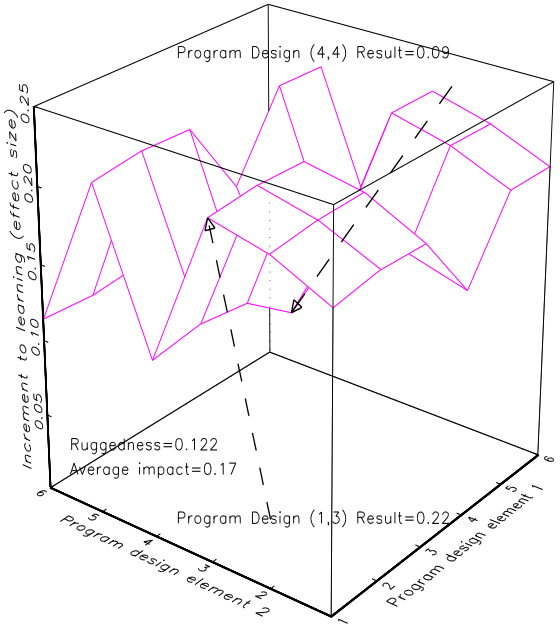
Response surface in context B—design doesn't matter much, nothing works



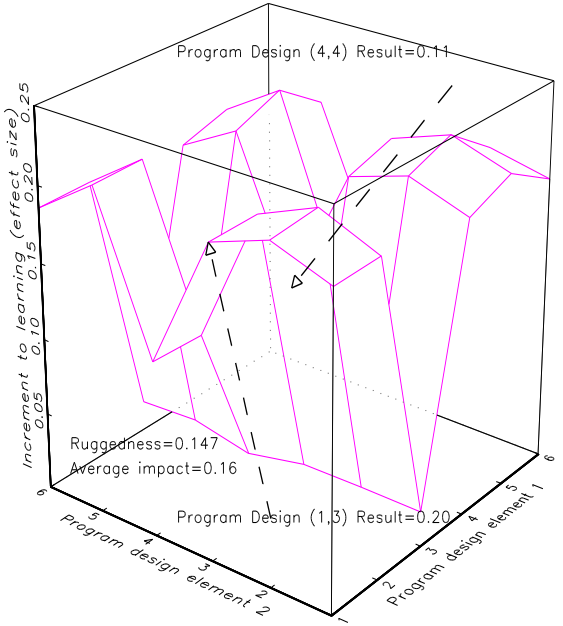
Source: Lant Pritchett (2018)

Challenges of context: Construct validity

- *Rugged* fitness functions imply different designs produce different results



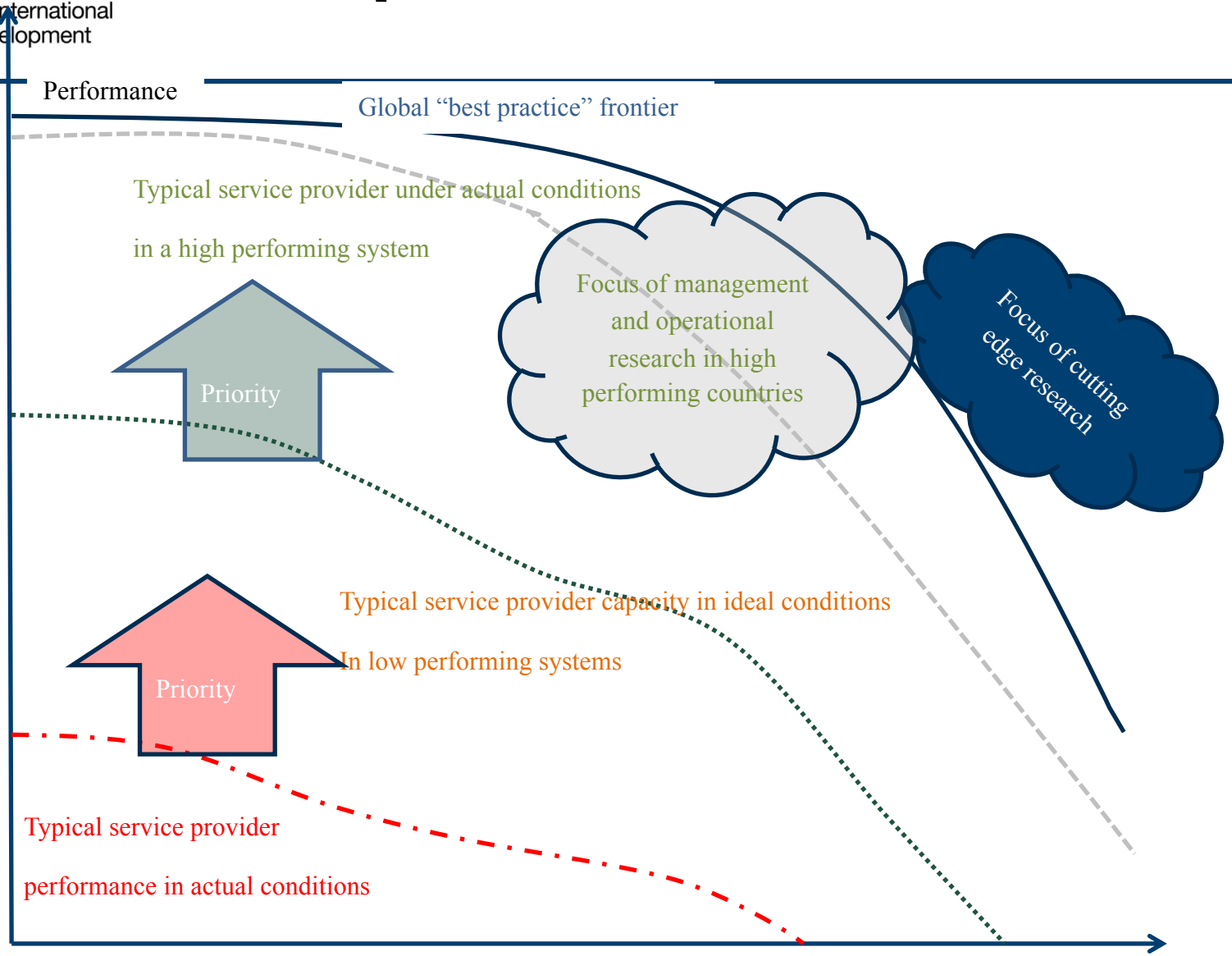
One “class” of program (“textbook provision”)



A different class of program (“teacher training”)

Source: Lant Pritchett (2018)

What to prioritise?



Source: Lant Pritchett (2018)

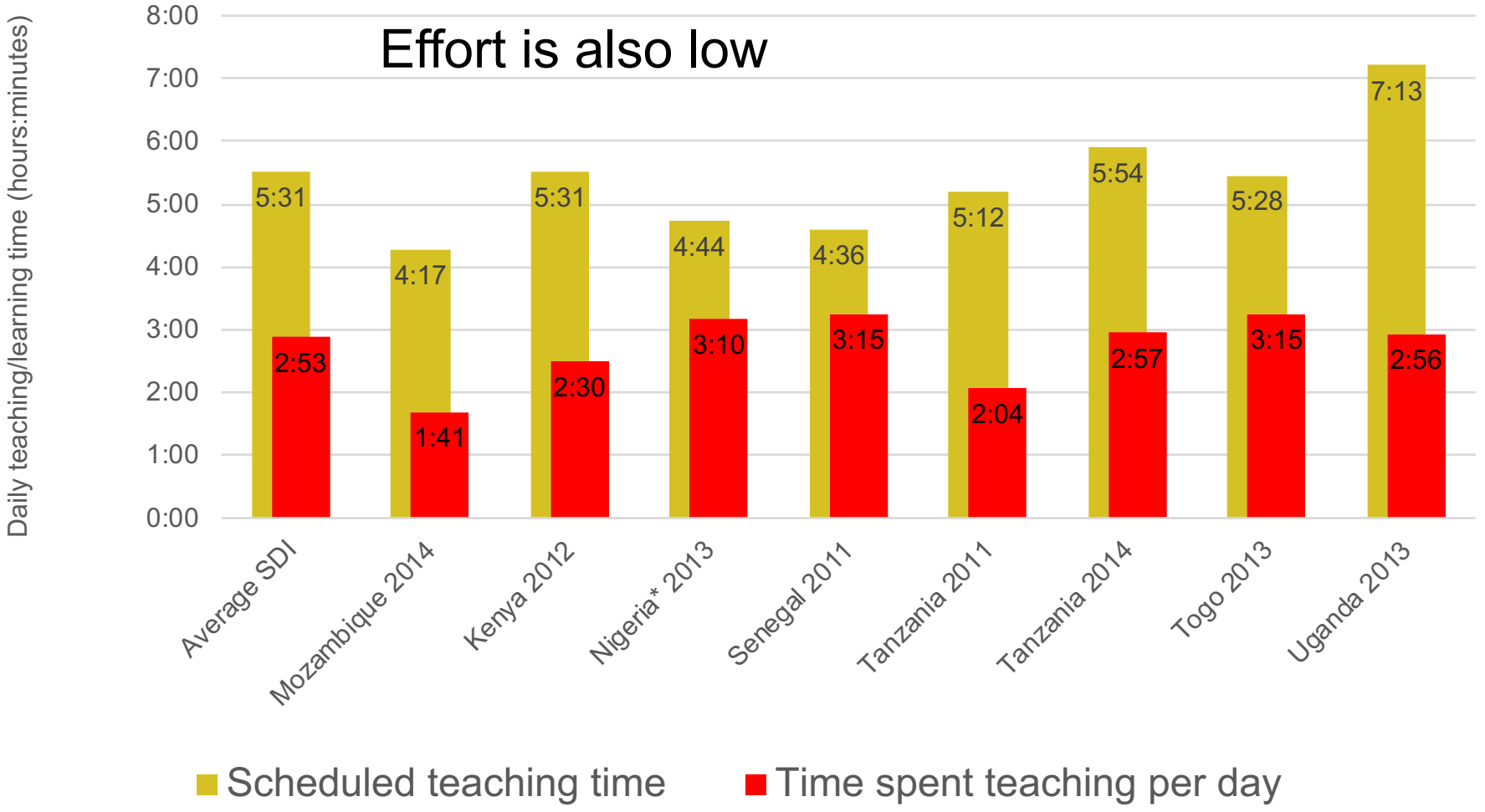
SDI Findings: Teacher skills in public schools

	Average SDI	Kenya 2012	Mozambique 2014	Nigeria* 2013	Tanzania 2014	Togo 2013	Uganda 2013
Minimum knowledge (At least 80% in language and mathematics)	12.7	34.8	0.3	2.4	15.6	0.9	10.1
Average test score (language, mathematics, and pedagogy); "Full marks" is 100.	42.0	55.6	26.9	30.5	46.6	33.9	43.3

The *capacity* of individuals is often very low

* Nigeria is 4 States

Source: Deon Filmer (2015)



Source: Lant Pritchett (2018)

Can an emphasis on costs be consistent with transformative impact?

- “Value for money can result in prioritising short-term development results over working through country systems and building national capacities for the longer term.” – ICAI February 2018
- CBE success: funding and commitment from Ghanaian government
- Effects on education systems need to be accounted for if cost-effectiveness if to aid development effectiveness