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Aiming Higher: Learning Profiles and Gender Equality in 10 Low- and Middle-Income Countries

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Abstract

Global education goals have many aims, among them universal basic schooling, universal literacy and numeracy, and gender equality. We use unique, nationally representative data on adult learning outcomes to examine the link between schooling and literacy in ten low- and middle-income countries. We simulate scenarios of increasing school grade attainment, increasing learning per year, and achieving gender equality, and examine learning outcomes in each. In six of the ten countries only about half or less of younger adults (aged 18-37) with primary completion as their highest schooling can read a few sentences without help. Simulations show that achieving universal primary completion would still leave many adults functionally illiterate: in India nearly a third of adults would still be unable to read. Our simulations further show that, while achieving equality of schooling attainment would produce improvements in women's literacy, in many countries this would still leave a third of women still unable to read. Gender equality of learning per year produces very little gain as, once in school, girls' learning nearly matches that of boys. In nearly all countries steepening the learning profiles for all students to the best-performing of the ten countries would lead to greater gains in literacy for women than achieving gender equality in both schooling and learning. Achieving learning for all will require both eliminating gender gaps but also improving how much is learned while in school.

Keywords: Learning profiles; Education quality; Gender equality; Education goals

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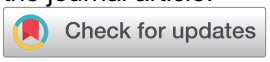

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Introduction

In recent decades, the world has made immense and rapid progress on expanding schooling. Between 1950 and 2010 the number of years of schooling completed by the average adult in a developing country more than tripled, from 2.0 to 7.2 years (World Bank, 2018).[1] Yet school grade attainment alone was never the end goal of these efforts; the goal was expansion of *education*, or schooling plus learning (Filmer et al., 2006).

The elision from education goals to schooling targets is common, if not ubiquitous, in the modern global system. For instance, the Millennium Development Goal for education was to achieve universal primary education, but the target reduced this *education* goal to a *schooling* target:

MDG Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.[2]

Most global sources of internationally comparable data on education, particularly for developing countries, provide data exclusively on schooling and inputs into schooling.[3] Similarly, many countries maintain sophisticated information management systems (EMIS) but in many instances these cover almost exclusively data on enrollments and inputs and include no reference to any measure of learning.[4]

The assumption that would validate the elision of "schooling" with "education" is that something like the MDG's "full course of primary schooling" reliably yields a minimally adequate education. If schooling, nearly everywhere and always, provided the skills, capabilities, competences, dispositions and values children need to thrive as adults then conflating education goals with schooling targets might be harmless and a focus exclusively on access and schooling attainment perhaps justified. Put another way, if the *learning profile,* the empirical relationship between schooling completed and levels of assessed skills, capabilities or learning outcomes, is strong (learning increases substantially with more schooling) and tight (learning increases for nearly all students) then schooling would be an adequate proxy for learning.

However, increasing evidence shows that in many developing countries the learning profile is neither strong – additional years of schooling are associated with very small learning gains – nor tight – students progress at very different rates and have very different learning even at the same grade or level of schooling.

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[1] For more on the massive expansion of schooling see Meyer et al. (1977); Meyer et al. (1992), and Boli et al. (1985)

[2] http://www.un.org/millenniumgoals/education.shtml

[3] Pritchett (2014) points out that in the UNESCO Institute for Statistics (UIS) data, the primary source of the UN for data on "education" there are hundreds of data series for each country and relatively complete and recent coverage for nearly all countries on schooling but very few on any direct measures of learning.

[4] Pritchett (2014) reports that in the information "report card" on education in the Indian state of Tamil Nadu there were 817 different indicators reported—not one of which was any direct measure of learning.

Further, many global education goals also target gender equality, under an assumption that equality will yield a minimally adequate education for girls. If boys are consistently reaching schooling and learning goals and girls are not, then such an assumption may be justified. But if boys also are not reaching such goals, then achieving equality could fall far short of achieving a quality education for all.

Recent evidence suggests that the gender gap indeed is often small compared to education gaps based on geography, wealth, or "pure" inequality – the difference between the best and worst performers. Moreover, in SACMEQ assessments, girls outperform boys on reading so bringing girls' outcomes in line with boys would leave girls (on average) worse off (Crouch and Rolleston, 2017). A review of education studies suggests that programs targeting both boys and girls can perform just as well and sometimes better for girls' learning as girl-specific programs (Evans and Yuan, 2019). Of course there are additional benefits to girls education, including safety from violence, reduction in early pregnancy and marriage, and more. But every education system expects that foundational skills including literacy and numeracy will be achieved from schooling.

This paper utilizes new datasets covering nationally representative cohorts of adults in ten developing countries in Africa and Asia to examine learning profiles and explore how strong and tight learning profiles are across these countries. Using this data, we simulate scenarios of increasing school grade attainment (to universal primary completion), increasing learning per year, and achieving gender equality, and examine learning outcomes in each.

In six of the ten countries, half or less of the cohort of 18- to 37-year-olds with primary completion as their highest schooling can read, and in three countries less than a third of this group can read. Schooling is not reliably producing even modest levels of learning.

Literacy among primary completers also varies widely between countries: in Nigeria only 19 percent can read, while in Tanzania, 80 percent can. Thus a common schooling goal across countries will indicate very little about the level of learning that will be achieved.

Simulating achievement of universal primary school completion, we find that under this scenario literacy rates would have still ranged from only 46 to 82 percent. The average gain across countries in this scenario is just eight percentage points.

Simulating an improvement that instead steepens the learning profile to that of the highest performing country in our sample (Indonesia, which is the highest performing of the ten but still a low achiever by international standards) yields massive gains in literacy for most countries. Uganda, for example, adds 35 percentage points to adult literacy by shifting its learning profile, and Bangladesh adds 26 percentage points. In the majority of countries, the gains from steepening the learning profile exceed those of expanding enrollment to universal primary completion.

Turning to gender equality, we examine disaggregated learning profiles, comparing learning for girls and boys and simulating counterfactual scenarios. In these scenarios, achieving gender parity for schooling attainment (girls completing the same amount of schooling as boys at observed learning levels) would increase women's literacy by just seven percentage points on average, to 67 percent literate. In Uganda, women's literacy reaches only 41 percent under parity for schooling attainment. Achieving parity on learning per year (at observed attainment levels) produces even less learning, and in some countries this reduces women's literacy (because girls were learning more per year than boys). On average, women's literacy increases by just two percentage points under parity for learning per year, and in three countries the "gains" are negative. Achieving parity on both schooling and learning would leave 30 percent of women illiterate on average.

An alternative policy approach steepens the learning profile for all students to that of Indonesia (rather than prioritizing parity). This final scenario yields the largest gains for young adult women of all scenarios analyzed.

I. Data for learning profiles

This paper extends the very small literature that uses adult data to estimate learning profiles. To date there have been two primary ways of assessing student learning. The first and most common way is by assessing a representative sample of in-school students in a given grade or of a given age. This includes most national and internationally comparable assessments such as PISA, TIMSS, SACMEC, PACMEC, and more. Such assessments have shortcomings, however, particularly in lower income countries. In low- and middle-income countries, coverage of only in-school children can leave out a substantial portion of a cohort. In the PISA-D assessments, for example, which extended PISA to seven developing countries, only 43 percent of 15-year-olds were eligible by being in school and in at least grade seven, so no information is available from this assessment on the learning of the other 57 percent of the cohort.

Further, because such assessments typically cover only one or a couple grades, the learning profile, which shows the trajectory of learning across grades has to be inferred. An assessment at a single age or grade level is only a snapshot of a given point of the learning profile.

A second type of assessment has come about more recently. In recent years the organization Pratham via ASER has pioneered the use of a single assessment instrument for all children in a broad age range based on household (not in-school) sampling and visits (Banerji, Bhattacharjea and Wadwa 2013). This allows the empirical learning profile to be estimated directly by comparing the assessed skills/capabilities of children at various ages and grades, including those in and out of school. By assessing the ability to read and do arithmetic for children at all ages from 6 to 14 years ASER thus can show the shape of the learning profile for children currently of school age.

The Financial Inclusion Insights (FII) data which we use in this paper represents a third option for analyzing learning profiles.[5] The surveys are nationally representative surveys of adults in ten low- and lower-middle income countries, including Bangladesh, Ghana, India, Indonesia, Kenya, Nigeria, Pakistan, Rwanda, Tanzania, and Uganda.[6] They allow us to estimate retrospective learning profiles for adults of varying levels of schooling completion. This approach opens new opportunities for analysis of learning as increasingly household surveys around the world contain simple literacy and/or numeracy tests that allow analysis of learning among adults. Analysis of adult learning data has both advantages and disadvantages compared to the two standard approaches.

One advantage is that by assessing a full cohort it provides data on all those within a given age range regardless of schooling attainment. This avoids the problems of assessments that cover only in-school children and therefore exclude those who have dropped out.

A second advantage is that by including adults of varying levels of schooling completion, this approach can estimate a descriptive learning profile across grades or levels of schooling completed, and therefore can show the shape of the learning profile. This is an advantage over assessments which only assess children in one or a couple grade levels.

A third advantage is that the FII measures literacy among adults. This is in some ways better than child literacy levels (as assessed by ASER-like instruments) as it shows the literacy that adults have retained and can use in the workforce, in the home, and in society. Skills acquired but inadequately mastered and not retained are arguably less important than retained skills.

There are two disadvantages of the FII data for this purpose. One, the data has to cover a broad age range of adults in order to have sufficient sample size. We focus on the cohort of young adults aged 18 to 37. While the surveys include respondents aged 15 and above, the youngest ages have not yet had the opportunity to complete secondary school and so are not included in the analysis. The upper bound of age 37 was selected to ensure adequate sample sizes, including when the data is split by gender.[7] This means we are estimating a learning profile averaged over a fairly long period in the past. The second limitation is that there is only one question that assesses reading, to which we turn in the next section[8].

[5] See Kaffenberger (2019) for more details on types of learning profiles.
[6] Samples sizes range from N=2,000 to N=6,000 in all countries except India, where the sample size is N=45,000
[7] While this cohort represents the most recent to have completed school, they are reflective of the school system from some years ago. For example, an 18-year-old who began primary school at age 5 would have started school in 2003, while a 37-year-old would have started school in 1984. This lag is unavoidable when analyzing outcomes of adults who have completed schooling.
[8] The survey instrument also included some questions on numeracy but they were structured to be extraordinarily easy. One question (in the Kenyan wave 3 instrument) was "If you have 1000 shillings and someone gives you 200 shillings how much do you have?" This doesn't really even probe ability to do multi-digit addition with carry. Another question asked if you deposited money with interest would you later have more money (not how much more, just more).

It is also possible that adult literacy could be influenced by factors other than their years in school, and that adults could gain literacy after their time in school. Macro factors, such as labor market characteristics could influence adults' choices about later learning. We deal with this limitation in part by using a literacy test that assesses basic, functional literacy. Literacy is a learned skill, and it is most commonly learned in school, so while it is entirely possible for adults to gain basic literacy skills outside of school it is unlikely to happen on a large enough scale to change our results.

We stress that all three of the methods: in school assessments, in home assessments of youth, and the new use of adult assessment (here and in Pritchett and Sandefur, 2017) show very similar results. The international assessments show (for the participating countries) that many developing country students are, at the ages and grades assessed, far behind the OECD and leading East Asian countries. Further, when researchers are able to examine grade attainment and learning profiles jointly they show that deficits in learning are often not primarily driven by deficits from enrollment and grade attainment but rather deficits in learning per year (Spaull and Taylor 2015 in Africa using SACMEC, Asadullah and Chaudhry 2013 in Bangladesh, and various ASER and UWEZO assessments).

I.A. Financial Inclusion Insights schooling and literacy data

To measure schooling, the FII surveys ask respondents for their highest level of education, and enumerators record responses in terms of level of schooling completed. For example, answer options include, "no formal education," "primary education not complete," "primary education complete," etc. Because schooling levels are recorded, rather than specific grades, a shift from one level to the next does not have a constant meaning across households or countries: shifting from "no formal education" to "primary education not complete" could indicate completion of anywhere from one to five grade levels if primary school is considered complete at grade six. Moreover, across countries the number of years in "primary schooling" differs. The learning profiles however follow the trajectories that would be expected, with those with "some primary" having higher literacy than those with "no formal schooling", and those with "primary complete" having higher literacy than those with "some primary". In comparing across countries, we focus primarily on literacy among those with primary complete, as all education systems expect children to achieve basic literacy by the end of primary school.

To measure literacy the surveys administer a unique test. At the end of each questionnaire, respondents are asked if they will consent, or not, to the use of photographs taken by the enumerators in research materials[9]. The same text, translated from English to the relevant language, is used in each country. For the literacy test, respondents are asked to read the three-sentence consent form, and enumerators assess their reading ability against four categories: (4)

[9] The exact text (English translation) from the Kenyan survey instrument is: "We would like to take some photographs of you and your household. We will include some of the photographs in our reports. We might also publish some of them online on our website."

read the informed consent form fluently without help; (3) well but had a little help; (2) struggled and had a lot of help; or (1) unable to read and asked interviewer to read. We define a respondent as "literate" if they were classified in the top two of these four categories, indicating the ability to read a few simple sentences, perhaps with a little help. We define a respondent as illiterate if they required a lot of help, indicating they lack functional literacy, and if they were unable to read at all.

While a relatively low-bar for literacy (the categories do not imply any level of understanding of the text, and there is no test for ability to write), this targets practical literacy to be used in everyday life, as expounded in international literacy definitions. For example, the OECD defines literacy as "understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge potential" (PIAAC, 2009). The FII's use of a practical literacy test achieves the aim of testing literacy that is a means for participating in society. As another example, UNESCO defines literacy as the "ability to read and write with understanding a simple statement related to one's daily life. It involves a continuum of reading and writing skills, and often includes basic arithmetic skills."[10] The FII measure is a low-bar under this definition, as it leaves out the writing and understanding elements, as well as the optional numeracy.

I.B. Financial Inclusion Insights literacy measure relative to other literacy measures

It is difficult to compare how stringent different definitions of literacy are, but we do have two points of rough comparison. First, Indonesia participated in the PIAAC (Programme for the International Assessment of Adult Competencies) survey of adult literacy—but only for the city of Jakarta, which one might assume has better than average literacy. In the PIAAC assessment 56.6 percent of adults 25-65 with "less than upper secondary complete" were classified as "Below level 1" in literacy proficiency. In contrast in our estimates only 18 percent of those with less than secondary school complete were not literate by the FII standard. Therefore, many of those classified by our method as "literate" are in the 56 percent who are "below only level 1" in literacy proficiency by the OECD PIAAC standards. So our standard is well below the lowest level of literacy defined in PIAAC.

Another recent paper uses DHS data in which (only) women are asked to read a single simple sentence like "Farming is hard work" and the standard was being able to read all of the sentence (Pritchett and Sandefur 2017). Comparing women who completed primary school from the FII surveys to women who completed grade 6 from the DHS of similar age ranges shows strikingly close results, on average (Table 1). The average literacy level is 50 percent for the DHS and 49 percent for the FII. Some countries are substantially different (e.g. the DHS suggest very low literacy in Ghana while the FII show Ghana as about average; the DHS suggests very high

[10] http://glossary.uis.unesco.org/glossary/en/term/2090/en

literacy in Rwanda whereas the FII is high, but lower) but the correlation across the two sources is .82.

Table 1: Assessed ability of women with just primary education to read a simple sentence or passage is similar between the DHS and FII data

Country	DHS, women 25-34, highest grade was 6th, percent able to read all of a sentence	FII survey, women aged 18-37, completed primary, able to read a three-sentence passage
Nigeria	12.0%	15.4%
Uganda	54.4%	23.2%
Bangladesh	32.6%	29.5%
Pakistan	50.7%	44.2%
India	34.6%	49.0%
Kenya	65.3%	69.7%
Indonesia	75.2%	76.7%
Tanzania	86.2%	82.5%
Ghana	7.7%	47.9%
Rwanda	97.1%	77.7%
Average	51.4%	48.8%

Source: Pritchett and Sandefur (2017), and authors' calculations with FII data.

II. Learning profiles and simulated gains from improvements to schooling and learning

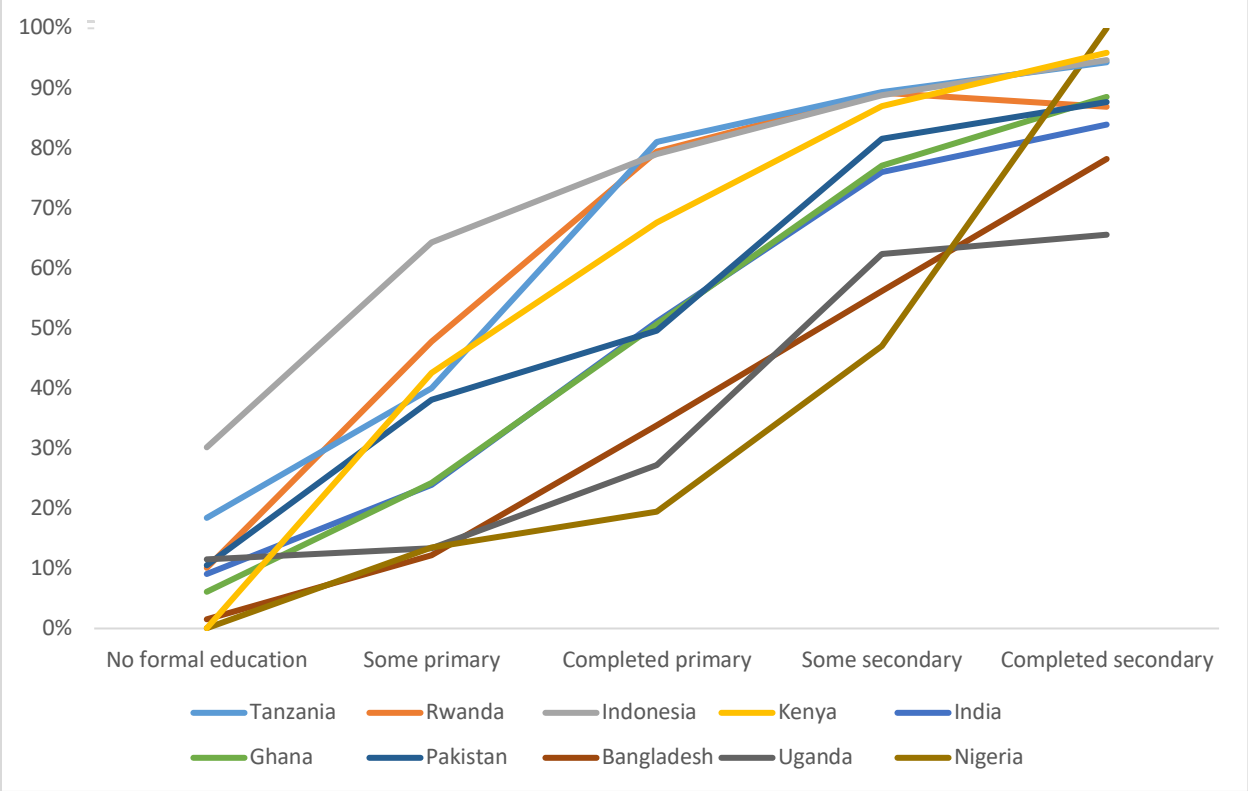
Using the FII data, we calculate learning profiles showing the average level of learning, in our case defined as literacy, for a given level of schooling. The learning profiles are descriptive, not attempting to draw causal conclusions about other factors or characteristics that drive the learning outcomes. Rather they show a simple illustration of the typical learning level of an adult who completed a certain level of schooling, thus showing the shape of the learning profile (Pritchett, 2013).

The learning profiles for the ten FII countries are shown in Figure 1. A steeper line indicates greater literacy gains across a given level of schooling while a flatter line indicates smaller literacy gains.

The first obvious fact from these learning profiles from the FII data is the variation across countries for individuals with the same reported level of schooling. Only 19 percent of adults with primary completion as their highest schooling in Nigeria and 27 percent in Uganda can read versus 81 percent in Tanzania or 79 percent in Indonesia. Pakistan, Ghana and India are in the

middle with only about half of those with primary completion as their highest schooling being able to read.

Figure 1: Learning is highly varied across countries and in six of the ten countries only half or less of primary completers can read



Source: Authors' calculations with the FII data.

The second key observation is how flat some countries' learning profiles are, particularly in the early grades, and how quickly differences in learning emerge. Of the ten countries, six have literacy levels among those with just primary complete of 51 percent or below.

Table 2: Literacy at the same reported level of schooling completed varies widely across the 10 FII countries, with only half of all primary school completers able to read

Country	No formal education	Some primary	Completed primary (sorted)	Some secondary	Completed secondary
Tanzania	18.4%	40.0%	81.1%	89.4%	94.3%
Rwanda	10.1%	47.8%	79.5%	89.3%	86.9%
Indonesia	30.2%	64.3%	79.1%	88.9%	94.7%
Kenya	0.0%	42.5%	67.6%	87.1%	95.9%
India	9.0%	23.9%	51.1%	76.0%	84.0%
Ghana	6.1%	24.2%	50.7%	77.1%	88.6%
Pakistan	10.5%	38.1%	49.6%	81.6%	87.7%
Bangladesh	1.5%	12.1%	33.9%	56.2%	78.2%
Uganda	11.5%	13.4%	27.2%	62.4%	65.6%
Nigeria	0.0%	13.5%	19.5%	47.0%	100.0%
Unweighted median	9.6%	31.2%	50.9%	79.3%	88.1%

Source: Authors' calculations with FII data. "Literacy" is defined as the being able to read a three-sentence passage either "fluently without help" or "well but with a little help."

1) There are only 29 individuals with "no formal education" in the Indonesia sample.

At higher levels of attainment, like secondary and tertiary, it becomes increasingly difficult to interpret the *descriptive* learning profile as a *causal* learning profile as the potential and actual role of learning-selective drop-out becomes more difficult. That is, if 100 percent of students progress from grade 4 to grade 5 then comparing learning of those two groups likely represents what, on average, was learned in 5th grade. However, if say the lowest 10 percent of learning performers drop out between grade 4 and grade 5 or if there is grade repetition and the lowest 10 percent of learners are not allowed to progress then the *descriptive* learning profile will show those with 5th grade complete as more likely to read than those with only grade 4 complete even if no child learned anything in grade 5. This is important as it means that the *descriptive* learning profile almost certainly *overstates* the degree of learning gained from level to level. The degree to which this occurs will vary from country to country and depends on the policies on automatic promotion, the extent to which there are early examinations (e.g. primary school leavers examinations), and the extent to which voluntary drop-out is learning selective.

These considerations make it all the more striking how flat the descriptive learning profiles are, even up until "some secondary" and "secondary complete." For instance, in Uganda

only two thirds of adults who reported having *completed* secondary school could read and in Bangladesh only 80 percent.

These simple calculations of the descriptive learning profile show that a global goal of "completing primary school" does not convey the same extent of learning, even of mastering the very basics of reading, across countries. The same is true within countries as knowing a person completed primary school does not reliably predict whether they can read or not—in the typical country it is 50-50 that a primary school completer can read. An assumption of a strong and tight relationship between "schooling" and "learning" is just not supported by the data.

II.A. How much learning would be gained from achieving universal primary completion?

The variation in learning outcomes across countries, combined with the shallow learning profiles of many countries shows that achieving an exclusively schooling based goal, like universal primary completion, would not yield consistent achievement of learning goals. But how much would be gained by increasing enrollment? To answer this question, we do a simple set of calculations to show how much learning would be gained at observed learning profiles, by increasing enrollment to universal primary completion (UPC) on the (generous) assumption that the descriptive learning profile portrays causal learning gains.

The arithmetic behind this calculation is simple[11]. The actual literacy is just the schooling level attainment weighted sum of the likelihood an adult with each level of schooling is literate (equation 1).

$$1)\ Literacy = \sum_{l=0}^{l} \alpha_l * s_l$$

Where α_l is the share of adults 18 to 37 with level l as their highest level attained (and no schooling is 0) and s_l is the share of adults with highest schooling attainment of l who can read.

The arithmetic of the counter-factual of universal primary completion at a fixed learning profile is easy; assume that all adults with attainment less than primary, which in our notation is levels 0 and 1, had the literacy levels of those with level 2 (primary complete).

$$2)\ Hypothetical\ Literacy = \sum_{l=0}^{1} \alpha_l * s_2 + \sum_{l=2}^{5} \alpha_l * s_l$$

The gain in literacy from UPC is the share in the lowest two schooling attainment categories (no school or primary incomplete) interacted with the gain in literacy from moving from those to primary complete.

[11] This section draws on Pritchett and Sandefur (2017).

$$3)\ Literacy\ gain = \sum_{l=0}^{1} \alpha_l * (s_2 - s_l)$$

Equation 3 is simple and intuitive. The gain in literacy from the counter-factual of all adults having completed primary is bigger: (a) the larger the share of adults who did not complete primary (level 2) (if all adults had completed primary then there would be no gain at all), and (b) the steeper the learning profile at the early years up to primary and hence the larger the gap in literacy between adults who completed primary and those who completed less schooling (if the learning profile were completely flat then there would be no gain at all).

Table 3 shows the results of the simulation of the gains from reaching universal primary completion at existing learning profiles. On average, the gains are quite modest. Achieving universal primary completion for this cohort of adults would have only increased literacy in these 10 countries by an average of 8 percentage points, from 65 to 73 percent of the cohort.

Table 3: Reaching universal primary completion at existing learning profiles produces small gains towards reaching universal literacy—on average only 8 percentage point increase in literacy, leaving 27 percent unable to read

	Data on cohort of men and women, ages 18 – 37, from FII data		Simulated counterfactual: all who did not complete primary school are shifted to primary completion at observed literacy level	
Country	Total literacy at current levels (sorted)	% of cohort who did not complete primary school	Total literacy under universal primary completion	Gain from this shift
Uganda	40.5%	39.6%	46.1%	5.6%
Bangladesh	46.5%	30.1%	54.7%	8.3%
India	57.8%	23.5%	67.2%	9.4%
Pakistan	60.2%	31.4%	70.4%	10.1%
Rwanda	62.7%	45.8%	81.9%	19.2%
Ghana	65.6%	17.3%	71.7%	6.1%
Kenya	72.3%	23.7%	81.2%	9.0%
Nigeria	76.7%	8.2%	78.0%	1.3%
Tanzania	77.5%	14.1%	85.1%	7.5%
Indonesia	88.1%	5.4%	89.3%	1.2%
Mean	64.8%	23.9%	72.6%	7.8%
Median	64.2%	23.6%	74.8%	7.9%
Source: Authors' calculations with FII data.				

There are two distinct sources of the low gains from achieving UPC.

One set of countries has a substantial proportion of the population with less than primary school but a shallow learning profile. In Bangladesh, for instance, 30 percent of the adult population completed no schooling or less than primary school. But, among those with primary school complete only a third could read. So even if none of the 30 percent could read initially, moving those 30 percent to primary completion would only produce a gain of .30*.33=10 percent. Pushing more students along a shallow profile is not sufficient to make literacy universal.

Another set of countries have small gains from the UPC counter-factual because there were few adults with less than primary complete. While Indonesia has a steep learning profile, with 80 percent of primary completers literate, only 5 percent of the population had completed less

than primary school so the gains in literacy were only 1.2 percentage points (from an already high level).

Rwanda would gain the most from UPC: it had both a large portion who have not yet completed primary school (46 percent), and a steep learning profile in the early years of schooling. Fully 80 percent of primary school completers are literate, so the gains from this shift are substantial. It is also the outlier; its gains from shifting to UPC (19 percentage points) are nearly double the next closest country (Pakistan, at 10 percentage points). No other country would gain nearly as much from having achieved UPC.

These calculations are optimistic estimates of the achievable gains from UPC for two reasons. First, we assume that the descriptive learning profile represents *at the margin* a causal learning profile whereas, as described above, there are good reasons to believe it overstates true learning gains of advancing the children who otherwise would have dropped out, due to the selectivity effects.

Second, this assumes that the descriptive learning profile could have been maintained even with large increases in the number of students. In reality, the relationship between schooling attainment and learning is dynamic. Large increases in schooling attainment would influence learning achievement, likely producing lower learning on average at least in the short run. If teaching capacity and infrastructure, for instance, were not adjusted to the higher enrollments that UPC would involve then the learning profile might deteriorate[12]. In this situation, our simulated learning gains from increased schooling are optimistic as they assume learning would stay constant in the face of large expansions in children's schooling attainment, meaning actual gains from UPC could be even lower.

II.B. Would more learning be gained from steepening the learning profile than achieving UPC?

We next explore an alternative counterfactual: What if enrollment of the cohort of 18- to 37-year-olds stayed at current observed levels but the learning profile changed? We choose Indonesia's learning profile as the counter-factual for two reasons: it is the best among these countries but at the same time it is, by international standards, modest and hence achievable for lower income countries.

At 88 percent, Indonesia has the highest literacy rate among the cohort we analyze in the ten FII countries. In Figure 1 Indonesia's learning profile is on-par or above most other countries at every schooling level. But, while the best among this set of countries, Indonesia's learning performance is quite modest by international standards. Indonesia has participated in a number of international assessments that assess secondary school students, such as the PISA and TIMMS. The PISA, for instance, is normed so that the average OECD student is 500 and the

[12] Bold et al (2013) for instance show that the move to zero fees in primary school in Kenya led to parental perceptions of declining quality.

standard deviation across OECD students is 100. On this scale in 2003 (which is relevant for our backward looking assessment of adults) Indonesia's PISA reading score was 382, the second lowest of all participating countries in that year.

In addition, just Jakarta participated in the PIAAC assessment, and literacy among adults who had completed secondary school was well below the OECD average. On the PIAAC scale adult Jakartans with complete secondary scored 205, which was well behind the OECD average of 264 for those with secondary complete and even well behind the OECD average of those with *less* than secondary complete of 231. Moreover, in recent PISA evaluations in 2012 and 2015, Vietnam has shown reading results at or near OECD levels. Vietnam's 2015 PISA reading score was 487, well ahead of Indonesia's of 397.

Hence, Indonesia's levels of learning are neither far-fetched for a low-income country nor a particularly ambitious standard to reach. Achieving Indonesia's learning profiles would require a systems-level shift in the countries being analyzed; they could not be achieved through small project-level interventions. But the size of the shift is not so large as to be implausible.[13]

To see how literacy would change if other countries maintained their own schooling attainment levels but had Indonesia's learning profile, the calculation is again arithmetically simple. We take the proportion of adults who completed each level of schooling and multiply by the literacy level of Indonesians who completed that level of schooling[14]. This gives the contribution to overall literacy of this group, given the Indonesian learning profile.

$$4)\ Hypothetical\ Literacy\ at\ IDN\ profile = \sum_{l=0}^{5} \alpha_l^i * s_l^{Indonesia}$$

Changes will again be driven by two primary factors: the proportion of the cohort who completed each level of schooling, and the difference between the country's own learning profile and Indonesia's learning profile. The greater the difference between a country's learning profile and Indonesia's the bigger the gain.

$$5)\ Literacy\ gain\ at\ IDN\ profile = \sum_{l=0}^{5} \alpha_l^i * (s_l^{Indonesia} - s_l^i)$$

[13] It is beyond the scope of this paper to discuss systems level interventions and policy instruments that could achieve these kinds of shifts, but research including that of the Research on Improving Systems of Education (RISE) Programme is endeavoring to address this question.

[14] We assume that those with "no schooling" are unchanged by the shift in learning profile, since they would not be affected by the school system. Thus the high proportion of literate among Indonesians with "no schooling" (with only 29 observations) has no impact on the calculations.

Table 4 shows that for countries with a shallow learning profiles (Uganda, Bangladesh, India, Pakistan, Nigeria) the gains from reaching Indonesia's learning profile are massive--several fold larger than achieving UPC. For instance, Uganda's current literacy is only 40.5 percent. Moving to Indonesia's learning profile, while keeping the same level of schooling attainment, would raise literacy to 75.2 percent; 35 percentage points more of the adult population would be literate. This is 6.1 times larger than the hypothetical gain from UPC. In Bangladesh, the gains from a steeper learning profile are 3 times larger than achieving UPC. The gains from a steeper learning profile are, on average, two and a half times as large as those from achieving UPC. These countries gain little from increasing schooling at current learning levels, but could achieve massive gains from steepening their learning profile.

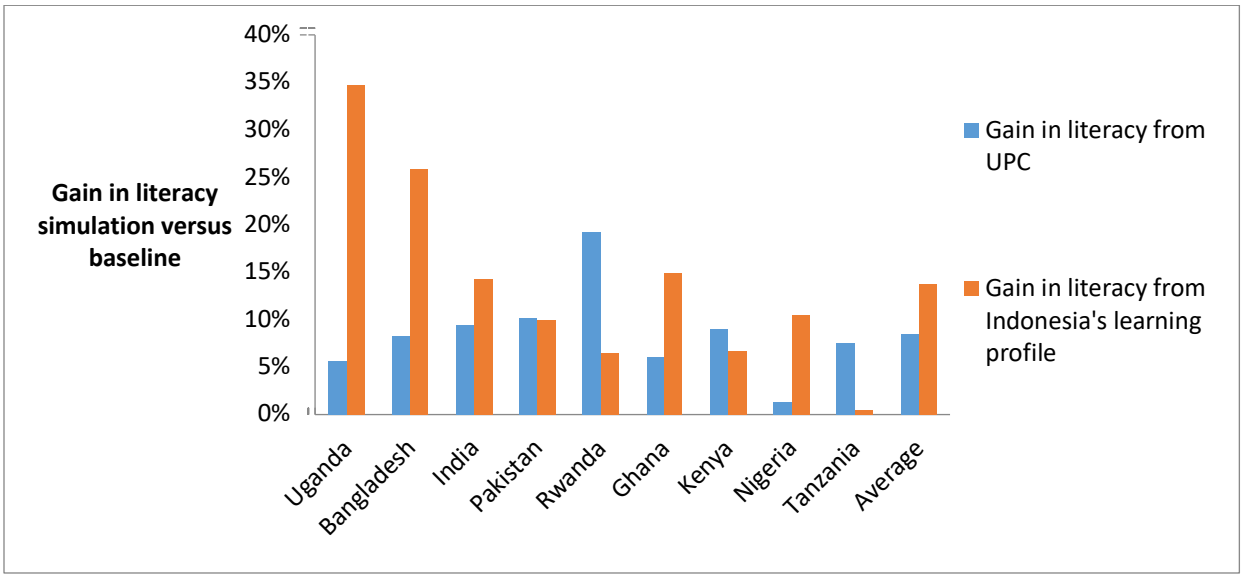
In other countries the gains are smaller. As we saw above, Rwanda has a steep learning profile and large numbers with less than primary complete. Therefore the gains from increasing the learning profile are only a third as large as from reaching UPC.

Table 4: The average gain from shifting learning profiles is more than double that from shifting to UPC					
	Data on cohort of adults ages 18 – 37 from FII data	Simulated counterfactual: all have Indonesia's learning profile at observed schooling levels		Comparing gains from learning profile shift to Indonesia's versus gains from UPC	
	I Total literacy at current levels (sorted)	II Total literacy at Indonesian learning profile	III Gain from shifting learning profile	IV Gain from UPC (from table 3)	V Ratio of gain from improved learning to schooling expansion to UPC (col III/ col IV)
Uganda	40.5%	75.15%	34.67%	5.64%	6.1
Bangladesh	46.5%	72.34%	25.87%	8.28%	3.1
India	57.8%	72.15%	14.31%	9.36%	1.5
Pakistan	60.2%	70.13%	9.89%	10.13%	1.0
Rwanda	62.7%	69.23%	6.49%	19.21%	0.3
Ghana	65.6%	80.51%	14.91%	6.08%	2.5
Kenya	72.3%	79.00%	6.71%	8.96%	0.7
Nigeria	76.7%	87.24%	10.54%	1.31%	8.1
Tanzania	77.5%	78.03%	0.49%	7.51%	0.1
Mean	64.8%	75.97%	13.76%	8.50%	2.6
Median	64.2%	75.15%	10.54%	8.28%	1.5
Source: Authors' calculations with FII data.					

Figure 2 summarizes these results. Figure 2 compares the percentage point gains to literacy from the simulations of either achieving UPC or of achieving Indonesia's learning profile. In the countries where the learning profile is weak (e.g. countries where the literacy of primary school completers was 51 percent or less: Uganda, Bangladesh, India, Ghana and Nigeria) the gain from a steeper learning profile is much larger than achieving UPC. In the countries that already achieve relatively high literacy through schooling, the gains were larger for achieving UPC.

This highlights the contrast across countries and the need for education system priorities to be context-specific. There are countries where increasing primary school attainment could still reap large rewards in terms of basic skills achieved. But in most of the countries included in this analysis steepening of the learning profile is needed. Education systems must clearly diagnose the schooling and learning dynamics in their context.

Figure 2: The gains in literacy are typically much larger from achieving a steeper learning profile than from achieving UPC, especially in countries with a weak learning profile (Uganda, Bangladesh, India, Ghana, Nigeria)



Source: Authors' calculations with FII data

III. Differences by gender and simulations of gender equality

We now turn to analysis of differences in schooling and learning by gender and scenarios of gender equality, examining them in three ways. First, we look at simple differences in schooling and literacy for women and men across the ten countries, and we look at the gains that would be achieved from UPC (as simulated in Section II.A.) disaggregated by gender. Second, we simulate various forms of equality. We simulate women's literacy if their schooling attainment were equal to that of men (keeping learning per year constant at observed levels); women's literacy if their learning per year were equal to that of men (keeping schooling attainment constant at observed levels); and finally women's literacy under equality of both schooling and learning with men. Finally, we replicate the analysis in Section II.B. of steepening learning profiles to the best performing of the ten, Indonesia, this time disaggregating by gender.

III.A. Schooling and literacy outcomes disaggregated by gender

The percent of young adult men and women who have not completed primary school varies widely across countries. Rwanda has the highest percent who have not completed primary school for women, at 49%, and for men, at 42% (Table 5). Uganda is second for both genders, with 46% of women and 32% of men not having completed primary school. In Indonesia, on the other hand, only 5% of women did not complete primary school.

Looking at gender gaps, Pakistan, Uganda, and India have the largest primary completion gaps, with primary completion for men about 13 to 14 percentage points higher than for women. In contrast, in Bangladesh and Indonesia, girls are slightly more likely to have completed primary school than men. On average across the ten countries, women are 7 percentage points less likely to have completed primary school.

Turning to literacy, we find women tend to have lower literacy levels, with a mean (unweighted) literacy gap of 9 percentage points across the ten countries. Uganda has the largest gap, at 17.5 percentage points, while Indonesia has the smallest, with essentially the same literacy level for women and men. On average, 60.5% of the young adult women cohort has basic literacy, while 69.5% of the young adult men cohort does.

Finally, we replicate the simulation analysis from Section II.A., simulating achieving universal primary completion, disaggregated by gender. As shown in Table 5, shifting to UPC increases literacy for both genders in all countries, but in many countries, women's literacy is still very low. For women in Uganda, literacy rises to just 39 percent, and in Bangladesh women's literacy is only 50 percent even after achieving UPC. On average, women's literacy under UPC is 69.2% while men's literacy is 76%.

The differences in literacy gains between women and men in this simulation vary, but in most cases are relatively small. In Rwanda, Tanzania, and India, girls gain about 5 to 6 percentage points more than boys from increasing enrollment to UPC. In Kenya, Uganda, Pakistan, Ghana and Nigeria the results are even smaller, averaging just two percentage points more for women than men.

III.B. Gains from gender equality

We next simulate scenarios of gender equality. We calculate the first counterfactual by shifting women's grade attainment to equal that of men. This simulates women's literacy as though women completed primary school, completed secondary school, and attended tertiary at the same levels as men (keeping women's learning profiles at currently observed levels). That is, we eliminate entirely the gender gap in schooling attainment but not the gap in learning conditional on attainment.

The results in column V of Table 5 show that in all countries, women's literacy increases if enrollment is brought in line with men's enrollment levels. This indicates that alleviating the gender schooling attainment gap (at all schooling levels) would lead to improvements in women's literacy. However, even at men's grade attainment levels, women's literacy is still very low in many countries. Uganda, again, fares poorest with women's literacy of just 41 percent even after equalizing completion rates. Average women's literacy under this counter-factual is 67 percent, just 7 percentage points higher than what is currently observed in the data.

In most countries women's literacy increases by a *smaller* amount with gender equality than with achieving UPC. Comparing columns IV and VI in Table 5 we see, for example, that literacy

in Kenya increases by 6.6 percentage points when women achieve men's enrollment levels, but by 10.4 percentage points when women achieve UPC. On average, achieving parity for enrollment levels increases women's literacy by 6.7 percentage points, while achieving UPC increases women's literacy by 8.7 percentage points.

Table 5: Simulating changes in schooling attainment							
		Data on adult cohort ages 18 – 37		Simulating universal primary completion (UPC)		Simulating shifting women's schooling attainment to equal that of men	
Country		I. Total literacy at current levels	II. % who didn't complete primary	III. Total literacy if none and some shift to complete primary	IV. Gain from this shift	V. Literacy level for women if they enroll at same rate as men for all grades (but learning stays constant)	VI. Gain from this shift
Uganda	Women	32.6%	45.7%	39.0%	6.4%	41.3%	8.7%
	Men	50.1%	32.1%	54.0%	3.9%		
Bangladesh	Women	43.4%	29.5%	50.4%	7.0%	47.3%	3.9%
	Men	49.9%	30.7%	59.9%	10.0%		
India	Women	51.1%	30.2%	63.0%	12.0%	62.3%	11.2%
	Men	64.5%	16.9%	71.0%	6.5%		
Pakistan	Women	53.1%	39.0%	63.8%	10.7%	64.2%	11.1%
	Men	66.7%	24.6%	75.7%	9.0%		
Rwanda	Women	58.8%	48.9%	81.0%	22.2%	62.9%	4.1%
	Men	67.0%	42.4%	82.7%	15.7%		
Ghana	Women	58.7%	20.4%	65.3%	6.6%	67.7%	8.9%
	Men	73.0%	13.9%	78.5%	5.5%		
Kenya	Women	69.9%	26.8%	80.2%	10.4%	76.5%	6.6%
	Men	75.3%	19.8%	82.5%	7.2%		
Nigeria	Women	73.2%	10.6%	74.6%	1.5%	80.0%	6.8%
	Men	80.4%	5.6%	81.5%	1.0%		
Tanzania	Women	75.8%	17%	85.6%	9.8%	81.0%	5.2%
	Men	79.6%	11%	84.5%	4.8%		
Indonesia	Women	88.3%	5%	89.2%	0.9%	88.6%	0.3%
	Men	87.9%	6%	89.5%	1.6%		
Mean	Women	60.5%	27.3%	69.2%	8.7%	67.2%	6.7%
	Men	69.5%	20.3%	76.0%	6.5%		
Median	Women	58.8%	28.2%	70.0%	8.4%	65.9%	6.7%
	Men	70.0%	18.4%	80.0%	6.0%		
Source: Authors' calculations with FII data							

For the second equality counterfactual, we keep schooling attainment at observed levels and calculate women's literacy if women had the same learning profile as men. This examines the possibility that girls who attend school learn less than boys, by having flatter learning profiles. The implication would be that if this counterfactual brings about large changes in women's literacy, then gender-specific changes to the schooling experience – so that girls who are in school learn at the same rate as boys – could reduce the gender literacy gap.

Columns III and IV of Table 6 shows the results of these calculations. Most countries have a gain of less than 3 percentage points, and three countries have a negative "gain" – meaning women's literacy *decreases* when learning is brought on par with men. Uganda is the outlier, with an increase in women's literacy of 10 percentage points in this scenario.

This indicates that once girls are in school, they typically learn to read at roughly similar rates as boys. The gender literacy gap, then, is not primarily the result of curriculum or pedagogy that work better for one gender than the other, but rather low levels of learning across the board, combined with disparate enrollment rates for boys and girls.

A final "simulation" of gender equality does not require additional calculations. To simulate women's literacy if they had the same schooling attainment and learning profiles as men, we need only look at men's literacy levels. Under this scenario, women's literacy would equal men's observed literacy, 69.5%. On average, this is a gain of 9 percentage points.

As with other scenarios, the results vary across countries. Countries with larger gender gaps gain more: Uganda, Ghana, India and Pakistan. In Indonesia women's literacy actually goes down slightly, as women had higher observed literacy rates than men.

III.C. Gender differences in literacy gains from shifting learning profiles

A final counterfactual replicates the simulation from Section II.B., in which learning profiles are steepened to match those of the highest performer – Indonesia – but now results are disaggregated by gender. This scenario examines the possibility of a "rising tide lifting all boats"; if the system improves learning per year for all students, how much learning would women gain?

As in Section II.B., school grade attainment is maintained at observed levels, and we shift learning per year to the levels achieved by Indonesia. In this scenario, women in Uganda have massive gains in literacy– gaining 40 percentage points, more than doubling the observed literacy rate. And, in Uganda men have large gains in this scenario too, with a 28-percentage point increase in literacy. The steepening of the learning profile for all students also reduces the gender gap in Uganda from 17.6 percentage points down to just 5.8 percent.

All but two countries have similar patterns, with literacy rising for both men and women, and the gender gap shrinking as women gain more than men. On average, shifting to Indonesian learning profiles has more than double the impact on women's literacy (an increase of 15.7

percentage points), than the nearest performing alternative (UPC which averages an 8.4 percentage point rise). And keep in mind Indonesia's learning profile is still weak by international standards. On average the gender literacy gap drops from 9 percentage points to 5.4.

Table 6*:* Simulating changes in schooling attainment and learning profile							
		Simulating shifting women's learning profiles to equal those of men		Simulating shifting women's schooling attainment and learning profiles to equal those of men		Simulating shifting all learning profiles to those of Indonesia	
Country		I Literacy level for women if they have same learning profile as men (but don't change enrollment rates)	II Gain from this shift	III Literacy level for women if they have same schooling and learning profile as men	IV Gain from this shift	V Total literacy if learning is at Indonesia's learning profile	VI Gain from shift to Indonesia's learning profile
Uganda	Women	42.1%	9.6%	50.1%	17.5%	72.8%	40.2%
	Men					78.6%	28.4%
Bangladesh	Women	45.7%	2.3%	49.9%	6.5%	72.8%	29.4%
	Men					72.1%	22.2%
India	Women	54.0%	2.9%	64.5%	13.4%	65.7%	14.6%
	Men					78.5%	14.0%
Pakistan	Women	55.9%	2.8%	66.7%	13.6%	64.2%	11.2%
	Men					75.4%	8.7%
Rwanda	Women	63.4%	4.6%	67.0%	8.2%	67.8%	9.0%
	Men					71.3%	4.3%
Ghana	Women	64.2%	5.4%	73.0%	14.3%	78.0%	19.3%
	Men					83.1%	10.1%
Kenya	Women	67.7%	-2.2%	75.3%	5.4%	76.8%	6.9%
	Men					81.7%	6.4%
Nigeria	Women	74.0%	0.8%	80.4%	7.2%	85.1%	11.9%
	Men					89.5%	9.0%
Tanzania	Women	74.4%	-1.4%	79.6%	3.8%	74.5%	-1.3%
	Men					82.3%	2.7%
Indonesia	Women	87.5%	-0.8%	87.9%	-0.4%	88.3%	NA
	Men					87.9%	NA
Mean	Women	62.9%	2.4%	69.5%	9.0%	74.6%	15.7%
	Men	42.1%	9.6%			80.0%	11.8%
Source: Authors' calculations with FII data							

The results of the five simulations are summarized in Figures 3a and 3b.

Figure 3a shows the gains in women's literacy over the observed levels for each of five scenarios: (1) UPC, (2) gender equality in attainment (but not learning profile), (3) gender equality in learning profile (but not attainment), (4) gender equality in both, and (5) Indonesia's learning profile. Several findings are clear.

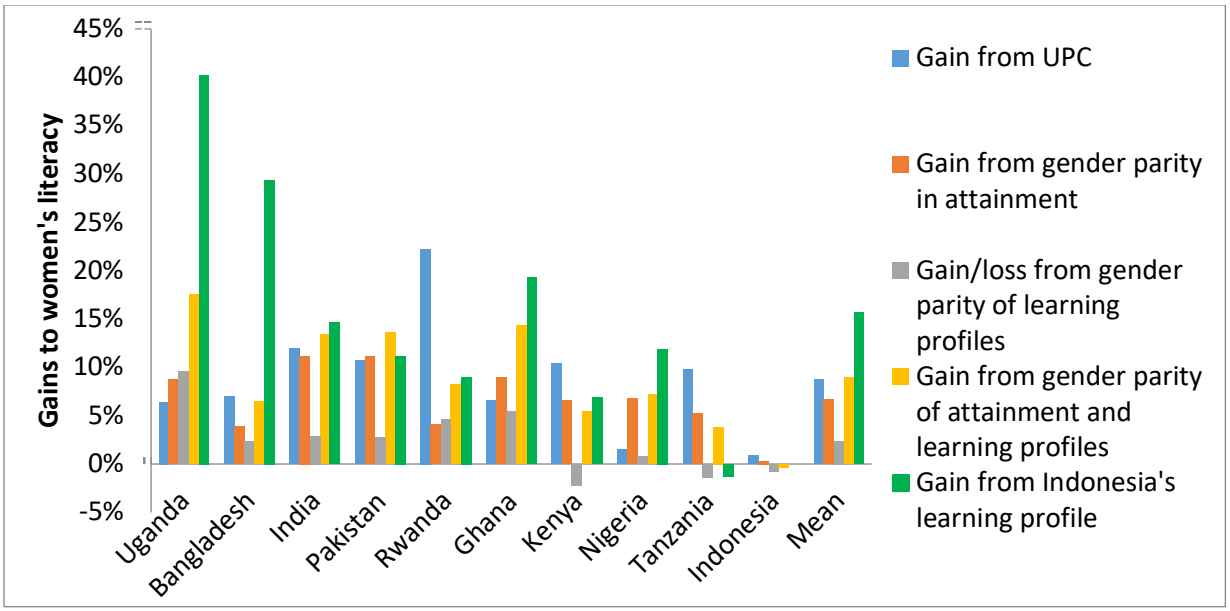
First, very little of the overall literacy gap is due to women being disadvantaged in the learning profile of reading. In three countries shifting to men's learning profiles actually reduces women's literacy, and in another five countries this increases women's literacy by less than 5 percentage points.

Second, the gain from UPC and from achieving equality across the sexes is about the same. That is, getting both boys and girls in school at least through primary completion produces about the same magnitude of women's literacy gain as equalizing men's and women's attainment at all levels (without achieving UPC).

Third, in countries with weak learning profiles the gains from steepening the learning profile exceed the gains possible from achieving gender parity in education (through women's parity with men on attainment and learning profile). Only in two countries – Tanzania and Pakistan – does gender parity achieve larger gains for women than steepening the learning profile. In some countries, such as Uganda and Bangladesh, the relative gains from steepening learning profiles are massive compared to gender parity. Averaged across the 10 countries the gains to women's literacy of a generally steeper learning profile (Indonesia's) are 6.5 times as high as equalizing men's and women's learning profiles alone and nearly twice as big as eliminating the gender gap in literacy entirely.

Fourth, the results vary a lot from country to country and whether UPC, gender parity, or a steeper learning profile produces the highest results depends on the factual conditions of each country with respect to primary attainment, gender differentials and the learning profile. That the results are completely different for three East African neighbors: Uganda, Tanzania, and Rwanda suggest caution in over-generalizing about the priorities for increasing girl's learning.

Figure 3a: Gains to women's literacy from gender parity are often smaller than either attaining UPC or than the gains from improving the learning profile for both sexes



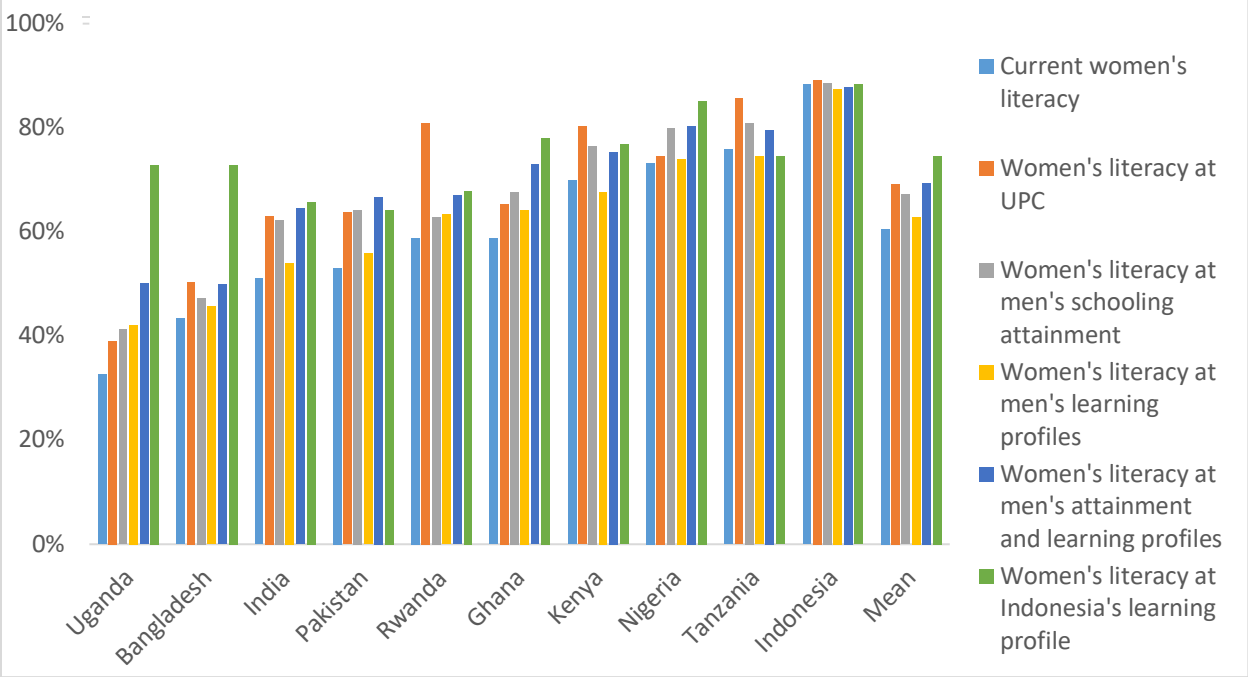
Source: Authors' calculations with FII data.

Figure 3b shows the same results but with the *levels* of literacy in each of the five scenarios rather than the gains/losses.

The most striking point in Figure 3b is that eliminating all gender gaps across these 10 countries would still leave many countries with an enormous problem with women's illiteracy. Even with the elimination of gender gaps only about half of women would be literate in Uganda and Bangladesh and only about two thirds of women in India and Pakistan.

Similarly, steepening the learning profile leads to substantial improvements in most countries but the learning profile can only affect those who attend school. While young adult women's literacy in Indonesia was near 90 percent, achieving their learning profile leaves India and Pakistan well short of that as women's schooling attainment is so low. Clearly both are needed, in various mixes in various countries.

Figure 3b: Levels of women's literacy, comparing current levels and simulated scenarios, shows that eliminating women's illiteracy requires more and better schooling



Source: Authors' calculations with FII data

Conclusion

Obviously these results do not downplay the importance of reaching universal completion of primary schooling – all children should complete a full course of quality schooling. But *education* is the basic human right declared in the Universal Declaration of Human Rights in 1948. All subsequent international commitments to *goals* have been to *education.* Hence the SDG commitment to universal literacy is a re-affirmation of the 1948 commitment to *education* as a basic human right.

Schooling has always been seen as instrumental to the objectives of education. However the easy elision of treating a goal of education and a target of schooling as essentially the same is dangerous when the link between schooling and the educational goals sought—and literacy is everywhere and always a learning goal of education—is not strong and tight. It is often assumed that schooling leads reliably to learning, and thus assumed that a schooling target, such as universal primary school, will yield some minimum standard of learning to prepare children for their future.

The FII data adds to the increasing body of data showing that the assumption that schooling *is* learning, and that schooling can serve as an adequate proxy for education, is sometimes right but all too frequently wrong. Using a simple measure of functional literacy, we show that a

single schooling target, such as universal primary completion, has wide variance in literacy outcomes. Across the 10 countries with FII data, even had universal primary completion between achieved literacy rates would have still ranged from only 46 percent to 82 percent. A common schooling target does not yield anything resembling a common learning goal.

The data also show that targets of gender equality – whether for schooling attainment, learning per year, or both – achieve gains for women's literacy but on average the gains are small. Parity in learning per year actually reduces women's literacy in some countries as boys learn less per year than girls who are in school.

This suggests that gender targets such as "gender parity indices" for schooling attainment and learning achieved are unlikely to be appropriate gender indicators. In a context where girls are increasingly likely to achieve as well or in some places better than boys, comparing them to boys may create a false sense of complacency, when the level of girls' education (and that of boys) should instead be compared to the levels they should be attaining.

The largest gains are obtained from shifting learning profiles upward, so that all students learn more during their time in school. While how to achieve such systemic shifts is beyond the scope of this paper, there is a growing body of literature examining how to reorient education systems towards learning. This kind of shift will require prioritizing foundational skills for all children, and aligning education systems to this goal.

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