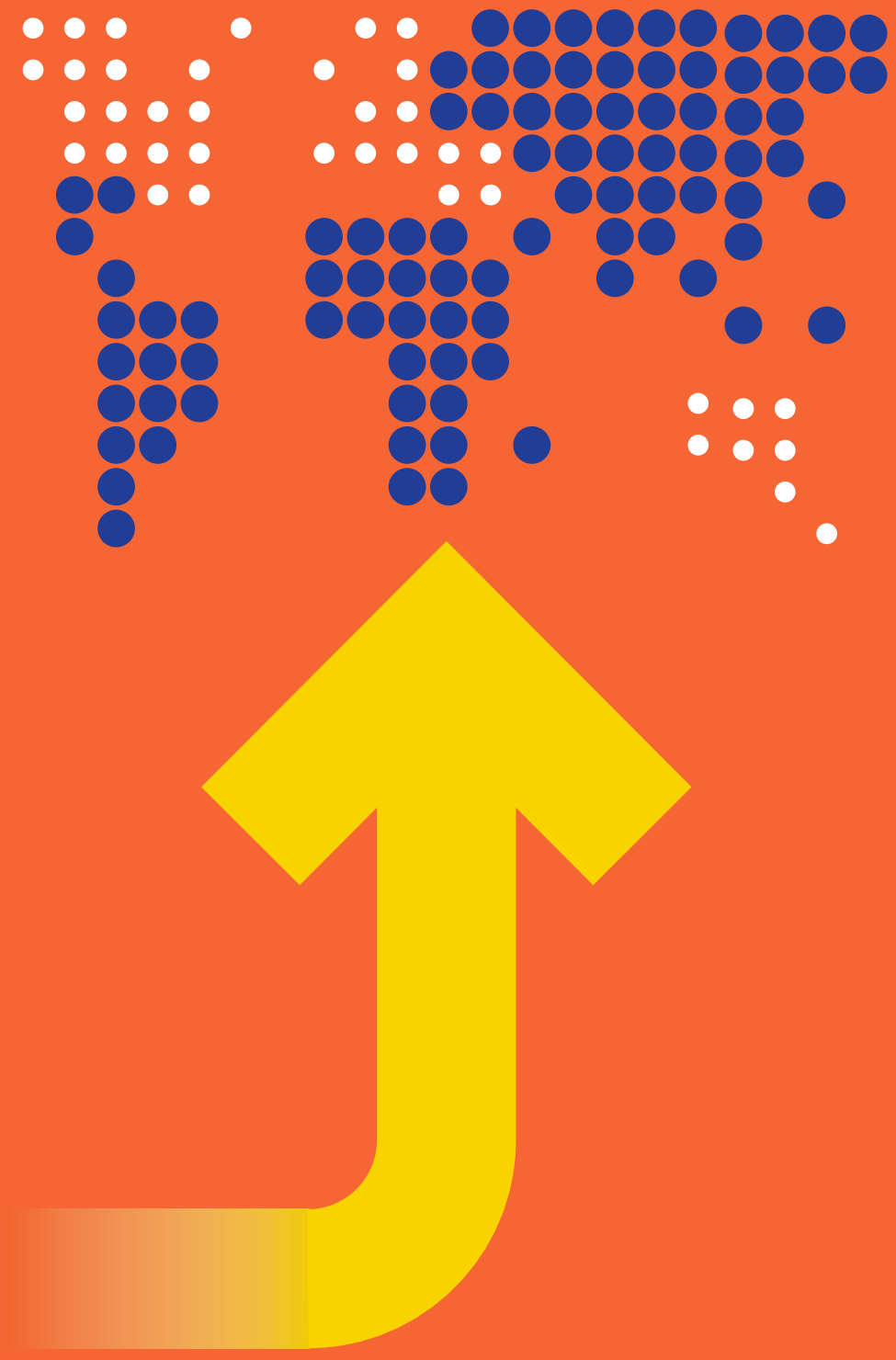

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2017 AFRICA EMERGING MARKETS FORUM

Background Paper

Building Human Capital: Improving Education Quality

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& Ritva Reinikka

JICA

Emerging Markets Forum
A nonprofit initiative of the Centennial Group

Building Human Capital: Improving Education Quality

Kaisa Alavuotunki & Ritva Reinikka

Preface

Dear participants,

This paper is one of ten papers which are expected to form a book focused on imagining Africa four decades from now. Of these ten papers, five will serve as background papers for sessions at the Fifth Africa Emerging Markets Forum:

- *Imagining Africa 40 Years from Now*
- *Demographics and Urbanization: Planning Cities That Work*
- *Building Human Capital: Improving Education Quality*
- *Transforming Rural Africa: Growing a Productive Agriculture Sector*
- *Africa's Infrastructure Deficit: Closing the Gap*

Another paper, New Threats to Africa's Stability and Growth, will also be distributed at the Forum. The remaining four papers are available on the EMF website:

- *The Impact of Commodity Terms of Trade in Africa: Curse, Blessing or Manageable Reality?*
- *Africa's Inclusive Growth Challenge*
- *Economic Diversification of African Economies*
- *Regional Economic Integration in Africa*

Following this Forum, the papers will be revised and published as chapters in a book which will be widely distributed to African leaders and policymakers, among other stakeholders. As such, we will welcome your comments and feedback during and after the sessions.

Harinder Kohli
Founding Director & Chief Executive
Emerging Markets Forum

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This paper was prepared by Kaisa Alavuotunki and Ritva Reinikka. They wish to thank Theodore Ahlers of Centennial Group, and Deon Filmer and Waly Wane of the World Bank for their most valuable inputs and guidance during the preparation of this paper. Tessa Bold of Stockholm University and Ezequiel Molina of the World Bank provided important inputs for the analysis of the Service Delivery Indicator data. Alden LeClair edited the paper and handled its technical production. Any shortcomings are solely the responsibility of the authors.

Executive summary

The vision 2050 for Africa—when the continent will be home to 2 billion people—includes a per capita annual income of USD17,500 and a skilled and productive labor force. In this vision, basic education would be universal and free for the first nine years, and enrollment would exceed 80 percent in secondary and 35 percent in tertiary education.

Education update. This paper is an education update for the vision for 2050 for Africa, with two broad objectives. First, it examines whether the education sector in Africa is on track with the targets set to make this bold vision a reality. Second, it takes a closer look at quality of education, especially in Sub-Saharan Africa (SSA) where education systems continue to expand vastly. We make use of recent data from student learning assessments as well as the Service Delivery Indicators (SDI), which focus on teachers. The analysis clearly shows that a vast improvement in education quality is urgently required.

Why the focus on students and teachers? Because basic skills, such as literacy and numeracy, cannot be leapfrogged; they must be learned by every student before higher and lifelong learning can take place. And because—among school-related factors—teachers matter most.

Good progress on public spending targets. To reach the vision 2050 targets, by 2030, SSA must almost double the size of its teaching force in place in 2010 in primary and lower secondary education. Allowing for some reduction in the pupil-teacher ratio and the needs in post-basic education, annual salary budgets should increase between 4 and 6 percent. There are a number forces behind the continued expansion of education systems. First, the population aged 5-14 years will almost double in SSA between 2010 and 2050; in North Africa, the increase is only 6 percent. Second, 24 percent of SSA's school-aged children were out of school in 2010, and they need to go to school. Third, there is a growing pressure for post-primary education arising from the success of rapid primary school enrollment growth over the last two decades.

Considerable public resources are already being spent on education in Africa—in many countries, education expenditure is on par with or higher than OECD countries. While real economic growth has been below the 6.6 percent per year of the Africa 2050 convergence scenario—3.9 percent per year in SSA in 2010-16—public spending on education has, since 2010, grown respectably, at around 8 percent annually, on average. This is more than adequate to expand the teaching force as projected in the vision 2050—and leaves substantial additional resources for other expenditure items as well.

But students are not learning. Global and regional learning assessments provide important information on quality of education. Only six African countries have participated in the Trends in International Mathematics and Science Study (TIMSS), an important global learning assessment. The results indicate that, compared to the rest of the world, a large share of pupils in Africa are spending years in school without learning basic math and science. Clearly, this does not bode well for productive youth employment—or for the economic catch-up with the rest of the world as articulated in the vision 2050 for Africa.

Results from regional learning assessments also suggest serious shortcomings. In Southern and Eastern Africa, the average proportion of pupils with a very low score in math—not even basic numeracy after six years in school—is 60 percent, ranging from 27 percent in Mauritius to 92 percent in Zambia. In West and Central Africa in 2014, less than 45 percent of students attained the competency level in reading or mathematics deemed "sufficient" to successfully continue their schooling.

In short, these regional assessments confirm that pupils in African primary schools learn far too little. In fact, UNESCO calls the current situation a "learning crisis." This crisis means that prospects of young people are stifled. It means that public education spending yields very low returns.

Teachers teach only half of the scheduled time. To shed light on the "learning crisis," the SDI focuses on

Improving quality of education is less about money and more about putting the focus squarely on learning.

schools and teachers. Specifically, it measures teacher effort using three principal indicators: absence from school, absence from classroom, and actual teaching time. On average, the absence rate from school is found to be 20 percent, ranging from 14 percent in Tanzania to 45 percent in Mozambique. At any given time, on average, every fifth teacher is absent from school in SSA.

When examining absence from classroom, we find that, on average, 42 percent of teachers are not teaching. They are either absent from school or, even if at school, absent from classroom. The classroom absence rate ranges from 23 percent in Nigeria to 57 percent in Uganda.

The result of absenteeism is that the actual number of hours that students are being taught is low; on average, 2 hours 53 minutes a day when the average scheduled teaching time is 5 hours 31 minutes. Thus, the time on task is only about a half of what the education policy requires.

Teachers' knowledge and pedagogical skills are weak. The SDI surveys found that only 13 percent of language and math teachers possessed at least what can be considered minimum knowledge to teach the curriculum they were teaching. Only 0.1 percent of Grade 4 teachers in Madagascar scored more than 80 percent on the language and mathematics curriculum test, compared to 40 percent in Kenya.

The average teacher test scores of language, mathematics, and pedagogy combined is 42 percent. The results vary substantially between countries, from 57 percent in Kenya to 27 percent in Mozambique. The weakest area is pedagogical knowledge.

Private schools tend to perform better than public schools. Their teachers exert more effort, demonstrate more knowledge, and exhibit better teaching practices than their public sector counterparts. Yet, private schools are not able to overcome some of the same systemic problems faced by public schools. Close to one third of teachers in private schools are absent from the classroom. The pedagogical knowledge of private school teachers is almost as weak as that of their public school counterparts.

Teachers' knowledge and skills matter for student learning. Analysis of the SDI data shows large positive effects of teacher's knowledge and skills on student learning. Specifically, comparing a student of a teacher with little content knowledge and pedagogical knowledge and skills to a student taught by a teacher with good scores on these dimensions, the latter has test scores which are 1.1 standard deviations higher. This is a very large increase and would make a very big difference in results—more or less the quantum leap that is required in quality of education.

Urgent action required to improve education quality. Improving quality of education is less about money and more about putting the focus squarely on learning. How can this be done? First, one must start with measurement. Currently, learning is measured at best sporadically. For example, SACMEQ in Southern and Eastern Africa was last carried out in 2007. Few African countries participate in international learning assessments, such as PISA or TIMSS. This state of affairs should change and regular learning assessments—either international or regional—should become the norm. Similarly, in the next update for the vision 2050 for Africa relevant quality targets will need to be developed.

Second, improvement in learning requires systemic reform. Such a reform needs to go well beyond the ministries of education and those reporting to them—it is a project for the whole of society. There is, unfortunately, no silver bullet, technical fix, or education intervention that will do it. Instead, to be successful, such a reform will have to strengthen the relationships of accountability between national and local politicians, education service providers, and parents. It is, therefore, about politics, incentives, and empowering parents and other stakeholders, with a focus on quality of education and learning. It is about "education for all—and all for education."

Student learning assessments and especially the SDI data on teachers provide countries an unprecedented nationally representative diagnosis of the quality problem at the school level. Finding solutions to the quality problem

Finding solutions to the quality problem should start with national dialogue, consensus building, and continued monitoring of progress. Just calling for more funding and inputs for education will no longer do.

should start with national dialogue, consensus building, and continued monitoring of progress. Just calling for more funding and inputs for education will no longer do.

Third, the vision 2050 for Africa calls for a broad-based approach in education. Why is it important? One reason is that, without broad-based education, much talent would be lost if poorer children did not get an opportunity to learn basic skills and beyond. The same would be the case if girls were not able to access good education. This large talent pool could not be harnessed for national productivity—and many would be condemned to the cycle of poverty. According to recent research findings, it is not just the average test scores—or the top test scores—that matter for economic growth but also the bottom scores. But to achieve broad-based learning, countries cannot ignore the serious systemic failures in quality of education.

Building Human Capital: Improving Education Quality

Vision 2050 for Africa—the role of education

The vision for Africa in 2050[1]—when the continent will be home to 2 billion people—presents a convergence scenario that includes a per capita annual income of USD17,500 and a skilled and productive labor force. In this vision, basic education would be universal and free for the first nine years, and enrollment would exceed 80 percent in secondary and 35 percent in tertiary education. African universities would have emerged as leading global research centers of excellence in areas such as extractive industries, agribusiness, and biotechnology.

This paper—an update of education in the vision for 2050 for Africa—has two broad objectives. First, it examines whether key education targets are on track to make the vision a reality. Second, it deepens the analysis of quality of education in Africa, especially in Sub-Saharan Africa (SSA). Quality-related issues were discussed in the original vision 2050 document but at a general level. This paper delves into details of quality by analyzing new and unique school-level data—and suggests an action agenda based on the analysis.

Specifically, this section first summarizes the quantitative targets set for 2010-2050 for education. Second, it makes a case for quality of education and learning to become top priorities in Africa. Third, it demonstrates that teachers are the most important school-specific element for quality and it argues that, therefore, any quality improvement program must include a focus on the teacher.

Quantitative targets

Using 2010 as the base year, quantitative targets were developed for the education sector in the vision 2050 for Africa.[2] These targets include doubling of the completion rate for an eight- or nine-year basic cycle, a five-fold increase in enrollment in both early childhood education and tertiary education, and a three-fold increase at the upper secondary level. To be sure, reaching these targets represents a major challenge. But the required annual growth rates for 2010-2050 are not as high as those African countries have actually achieved in the past four decades. Specifically, during the period 1970-2009 tertiary education in Africa experienced a 20-fold, secondary a 12-fold, and primary a 3.5-fold expansion.

There are factors that add to the challenge because the education systems are becoming much larger and more complex due to population increase and because underserved populations are typically more difficult and more costly to reach. Africa's population aged 5-14 is expected to expand 71 percent between 2010 and 2050. North Africa and Sub-Saharan Africa (SSA) will, however, have very different trajectories: population projections indicate an increase of 83 percent in the aged 5-14 cohort in SSA but only a 6 percent increase in North Africa. A slow demographic transition means that countries in SSA will need to continue massively to expand their school systems to educate new cohorts that are larger than the previous ones.

To reach the targets by 2030, SSA must almost double the teaching force in place in 2010 in primary and lower secondary education even at current pupil-teacher ratios.[3] Why such a large expansion? In addition to the near doubling of the population aged 5-14 in SSA between 2010 and 2050, 24 percent of SSA's school-aged children were out of school in 2010; they need to go to school and so should be included in the new student population. Assuming constant prices and salaries, the required annual increase in the salary budget to achieve the necessary teaching force is estimated at 3.3 percent.

However, in order to allow for some reduction in the pupil-teacher ratio and the needs in post-basic education, the annual salary budget should increase between 4 and 6 percent. Indeed, there is growing pressure for post-primary education—secondary schools and tertiary education—arising from the success of rapid primary school enrollment growth over the last two decades.[4]

1. Ahlers et al., 2014
2. Fredriksen and Kagia, 2014
3. Fredriksen and Kagia, 2014
4. These figures do not include any increase in public funding for early

Historically, public policy to advance basic literacy and numeracy has done more to advance human conditions than perhaps any other single policy.

Teachers' salaries account for the largest single item in education expenditures in most countries. In Africa, salaries for teachers and education officials account for more than 70 percent of the expenditure in education, approximately 12 percent of total public expenditure. In the decade preceding 2010, the annual increase in public spending on education was 5 percent. Hence, in light of the recent past the required increase should be feasible—but would call for the expected 6.6 percent economic growth rate underlying the vision 2050 for Africa.[5]

The expanding education systems, of course, have other needs than teachers alone. Especially, the number of new classrooms needed in Africa was estimated at 6.1 million for a total cost of US$71 billion or US$3.6 billion annually between 2010 and 2030.[6] In this update, we do not discuss classroom construction needs which, apart from governments, are funded by communities and donors.

Lastly, while the vision 2050 for Africa expresses a concern about quality of education as well as quality of existing teachers, no targets—quantitative or otherwise—were set. One reason might have been the lack of systematic evidence on these aspects. More recently, such data have become available both from various student learning assessments and from the new Service Delivery Indicators (SDI), the latter with a focus on teachers. We make extensive use of both of these data sources in this paper to address the quality issue in-depth.

Quality of education is key for the future

Historically, public policy to advance basic literacy and numeracy has done more to advance human conditions than perhaps any other single policy. Literacy and numeracy are not only core competencies but are also the foundation and prerequisites for higher and lifelong learning, as well as for innovation and adoption of new technologies. Laying this foundation cannot be leapfrogged.[7] Fundamental skills of literacy and numeracy must be learned—there are no shortcuts. Hence, basic education for all is critical—basic education where children actually learn while in school.

Literacy statistics reflect current and past learning outcomes. In the 15-24 age-group, the illiteracy rate in Africa is 28 percent today, with negative impact on labor productivity, family welfare, and demographic transition. In the past, illiteracy was most often an issue of lack of access to school and education—today it is increasingly due to children not learning even if in school. This paper argues that the illiteracy rate risks stagnating, or even worsening, if the quality of basic education does not drastically improve from the current situation.

… and teachers are key for quality

Several different factors contribute to student learning, including individual characteristics (ability) and family circumstances (such as income and parents' education). But research suggests that, among school-related factors, teachers matter most.[8] When it comes to student performance on reading and math tests, a teacher is estimated to have two to three times the impact of any other school factor, including facilities and leadership.

Despite common perceptions, effective teachers cannot reliably be identified based on their place or level of education or their experience (i.e., years they have been teaching). The best way to assess teachers' effectiveness is to look at their on-the-job performance, including what they do in the classroom and how much progress their students make on achievement tests. Recent evidence suggests that a teacher's impact on student achievement remains reasonably consistent, even if the teacher changes schools and regardless of whether the new school is more or less advantaged than the old one.

Training, recruiting, and deploying teachers hence must be one of the most important preoccupations of

childhood teachers even if it is now clearly understood by most that early years are critically important for human capital development.
5. Fredriksen and Kagia, 2014
6. Theunynck, 2009
7. Fredriksen and Kagia, 2014
8. Rand Corporation, 2012

African countries already devote relatively large shares of their public spending to education—in many countries education expenditure is on par with or higher than OECD countries.

the education systems in Africa if quality of education is to make the needed leap in performance. The teaching force has grown vastly in the past decades and, in 2010, it stood at 3.1 million primary and 1 million lower secondary teachers in SSA. Still, a doubling of the stock of teachers is needed by 2030 to achieve the targets of the vision 2050 for Africa. What these large numbers of teachers—both existing and new—do and know matters a great deal for quality of education.

The rest of the paper is organized as follows. The second section explores recent trends in public spending on education, comparing them with the targets set in the vision 2050 for Africa to see whether the continent is on track. The third section focuses on quality of education by examining results from global and Africa-specific student learning assessments. The quality of existing teachers is highlighted in the fourth section, which investigates what teachers do, what teachers know, and how this affects student learning. The final section concludes and suggests an action agenda.

Recent trends in public spending on education

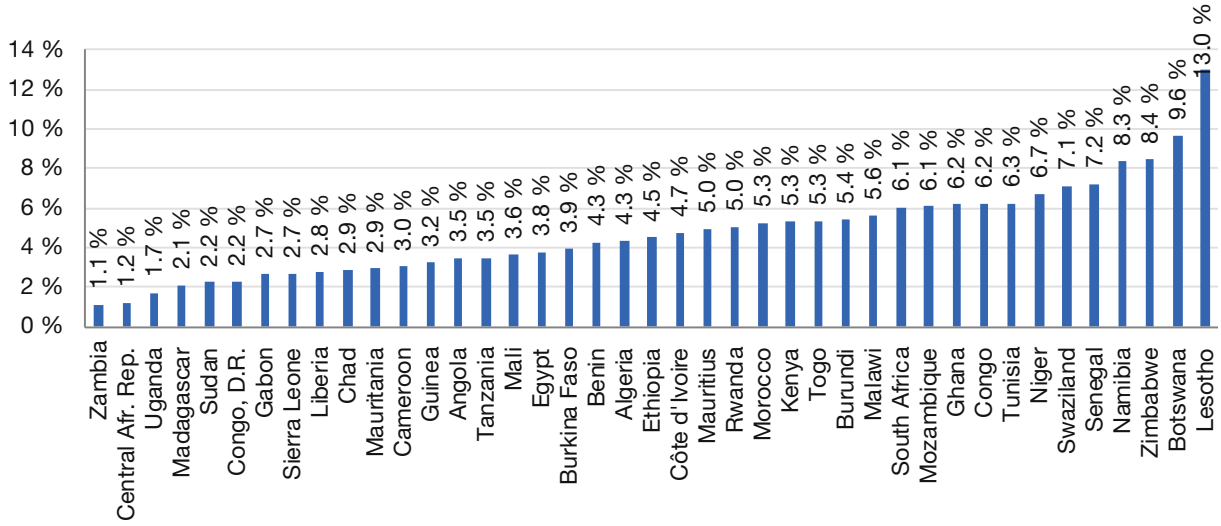
Is public spending on track for vision 2050?

African countries already devote relatively large shares of their public spending to education—in many countries education expenditure is on par with or higher than OECD countries. OECD countries spend an average of 5.2 percent of their GDP on education and 11.3 percent of their total public spending;[9] in comparison, African countries devoted 4.8 percent of their GDP and 17.2 percent of their total government expenditure to education in 2015.[10]

Figures 1 and 2 illustrate education spending as a share of GDP and as a share of total government expenditure, respectively, for 41 African countries. Variation across countries is considerable. Zambia and Central African Republic devoted only a little over 1 percent of their GDP and around 6 percent of their total government expenditure to education; at the other end, for example, Botswana

9. OECD, 2016b
10. UNESCO Institute for Statistics, 2016. In 2015 or the most recent year available.

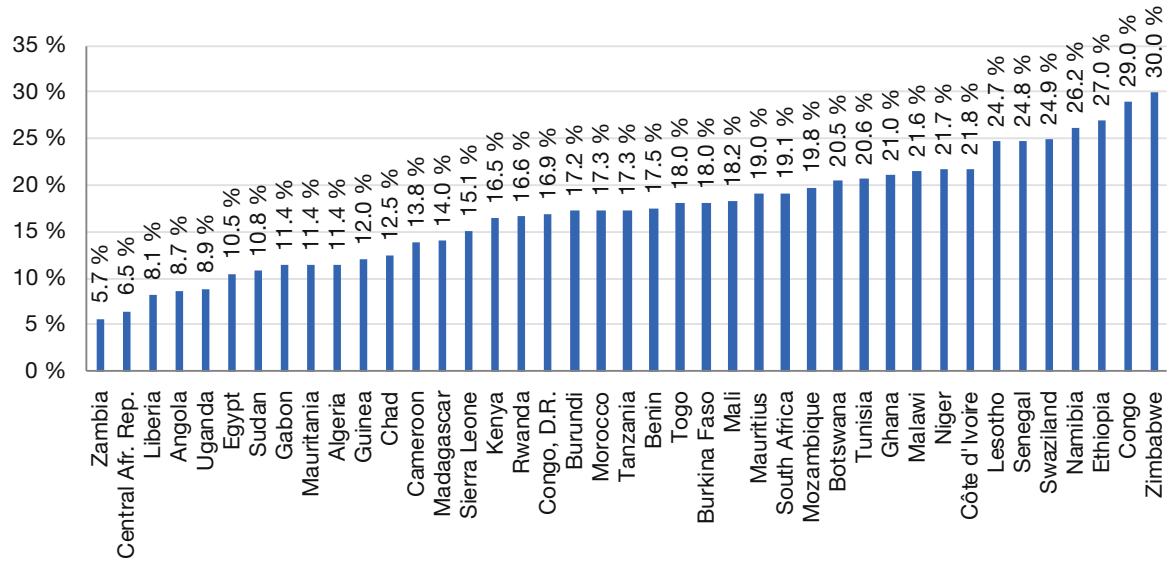
Figure 1: Public spending on education as a percentage of GDP, selected African countries



Note: 2015 or most recent year available
Source: UNESCO Institute for Statistics (UIS) (2016)

Public spending on education has grown at around 8 percent annually on average.

Figure 2: Share of education of total public spending, selected African countries, percent



Note: 2015 or most recent year available
Source: UIS (2016)

devoted 9.6 percent of its GDP and Ethiopia 27.0 percent of its total government expenditure to education.

Economic growth and the proportion of GDP that a country devotes to education spending jointly determine the incremental funding that is available for expanding the education system. Have countries managed to turn their economic growth into incremental spending on education required to stay on track for the vision 2050? Figure 3 shows average annual changes in government education expenditures (constant prices) since 2010 for 29 African countries. Indeed, public spending on education has increased in most countries, at an average annual growth rate of around 8 percent. In four countries—Sierra Leone, Malawi, Democratic Republic of Congo, and Niger— education spending has increased 15 percent or more annually.

Figure 4 shows how annual changes in education spending at primary and secondary levels vary by country, revealing large differences across countries. In Mali, the total spending on education increased annually by 13 percent, but primary education funding grew by 39 percent while spending on secondary education fell. Rwanda, on the other hand, has increased spending mainly on secondary education. Two countries, Niger and Malawi, have managed to increase spending on both primary and secondary education by over 20 percent annually.

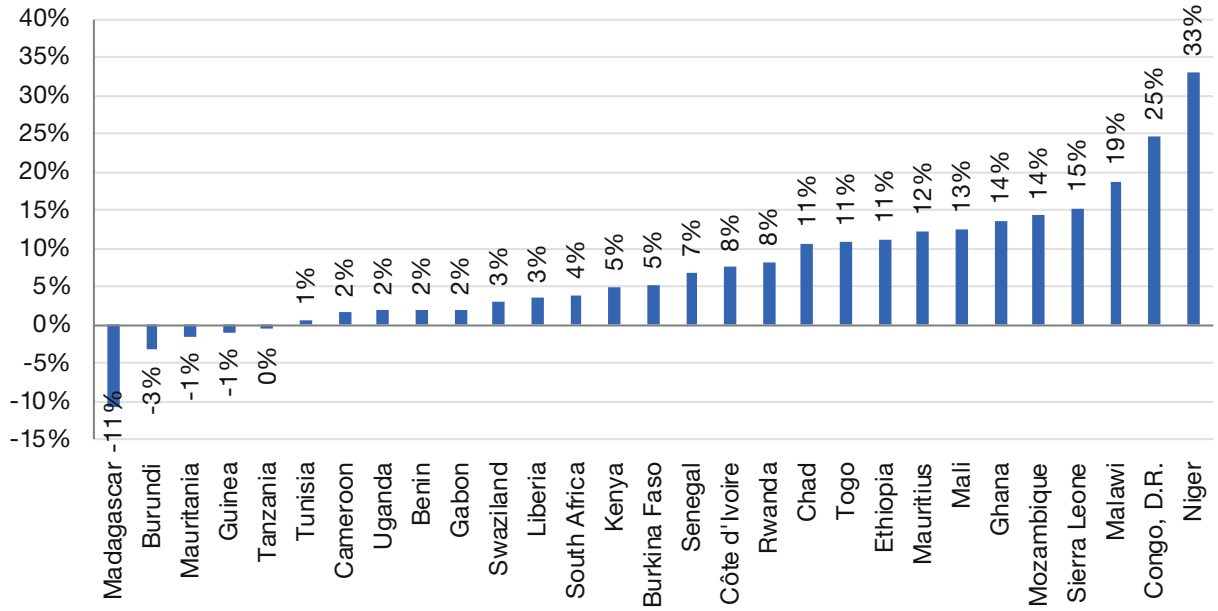
The above brief analysis shows that considerable public resources are already being spent on education in most African countries. Furthermore, while real economic growth has been below the 6.6 percent per year of the Africa 2050 vision—growth in SSA was 3.9 percent during the period of 2010-16—public spending on education has grown at around 8 percent annually on average.[11] This respectable growth in spending is more than adequate for expanding the teaching force as projected in the vision 2050 for Africa—and it leaves considerable additional resources for other expenditure items as well.

The high pupil-teacher ratio in SSA, however, has not budged much over the first half a decade of the vision

11. Private expenditure on education is also substantial in many countries but data are not readily available.

Financial resources are a necessary condition for quality education, but they are by no means sufficient.

Figure 3: Average annual change in public spending on education since 2010, selected African countries



Note: Most recent year available since 2010. Change in onstant local currency unit.
Source: UIS (2016)

2050. It was 42 pupils to 1 teacher in 2016[12] compared to 43 pupils to 1 teacher in 2010.

Weak link between spending and outcomes

Financial resources are a necessary condition for quality education, but they are by no means sufficient. Indeed, researchers have documented a weak correlation between spending and results in education from both cross-country and within-country analysis—whether measured in terms of aggregate spending as a share of GDP, spending per student, or trends over time.[13] The lack of correlation holds whether spending is compared to outputs (education attainment) or outcomes (learning), and it holds after controlling for other variables, such as incomes.

Figure 5 depicts an example of school-level data from the Malawi Primary School Leaving Exam pass rate and per-student spending—the unit cost includes teacher- and school book-related expenses—in government-funded schools. It is obvious that the link between spending and outcomes is at best weak—or rather non-existent. Unfortunately, Malawi is not an unusual example in this regard.

What learning assessments tell us about quality of education

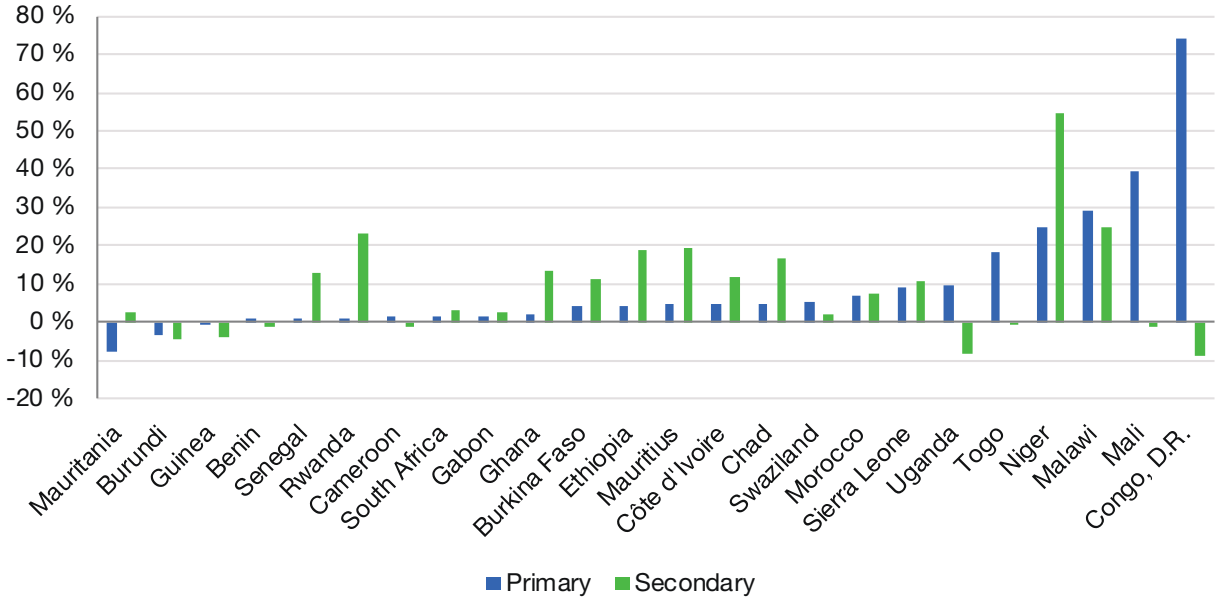
Evidence from global assessments

The Program for International Student Assessment (PISA) is a worldwide learning assessment conducted by the OECD in member and non-member countries.[14] It assesses 15-year-old pupils' performance on mathematics,

12. Sdindicators.org
13. World Bank, 2003
14. OECD, 2016a

A total of 72 countries participated in the most recent PISA round in 2015; the only African countries to participate in this round were Algeria and Tunisia.

Figure 4: Average annual change in public spending on primary and secondary education since 2010, selected African countries



Note: Most recent year available since 2010. Change in constant local currency unit
Source: UIS (2016)

science, and reading, with a specific focus on the application of knowledge rather than on the curriculum alone. A total of 72 countries participated in the most recent PISA round in 2015; the only African countries to participate in this round were Algeria and Tunisia. They ranked among the bottom five out of the 72 countries. Hence, while globally important, given that only two African countries participate, PISA is not a very useful source of information on learning from the African perspective.

Another global learning assessment is the Trends in International Mathematics and Science Study (TIMSS),[15] which is a series of assessments of pupils' mathematics and science knowledge carried out once every four years. During the past two decades, TIMSS has reported on mathematics and science achievement trends at the fourth and eighth grades, providing insights into how educational systems are functioning as well as critical intelligence about the possibilities for educational reform and improvement.

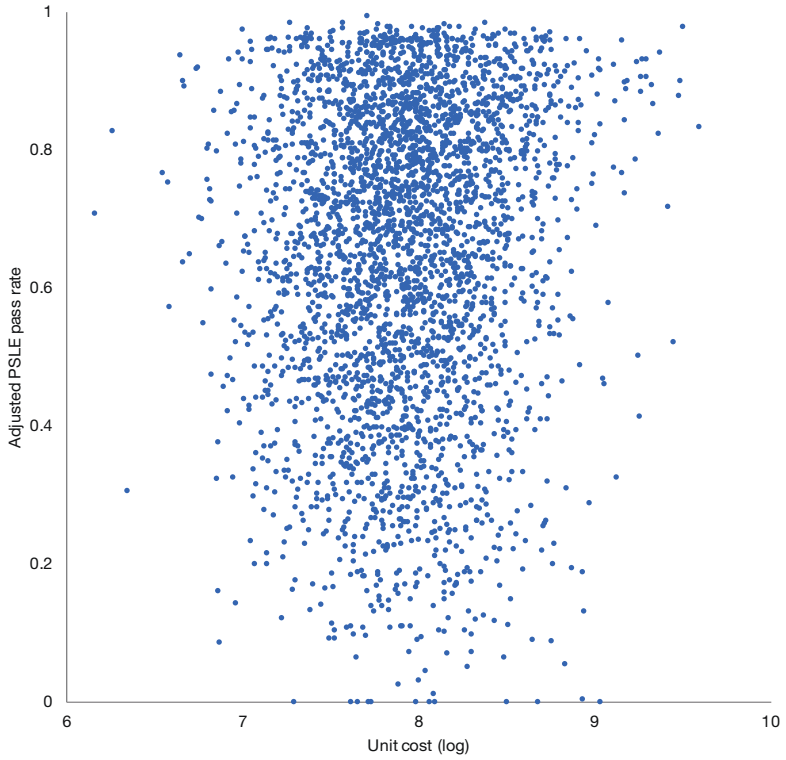
The most recent TIMSS results are available for 2015. Four African countries—Botswana, Egypt, Morocco, and South Africa—participated in this round. Ghana and Tunisia participated in the 2011 assessment. Figure 6 summarizes the results in the TIMSS math assessment for these six countries and shows a number of international comparators.

Singapore and the Republic of Korea are among the world leaders in math results according to TIMSS. Tunisia was the best performer among participating African countries, on par with Chile. Overall, African countries demonstrate low performance on TIMSS, all ranking among the bottom 10 among the 57 participating countries

15. TIMSS is carried out by the International Association for the Evaluation of Educational Achievement, a non-profit international scientific cooperative that has been active since 1958.

Overall, African countries demonstrate low performance on TIMSS, all ranking among the bottom 10 among the 57 participating countries in 2015.

Figure 5: Malawi primary school leaving exam pass rate vs. per-student spending



Source: Bruns, Filmer & Patrinos (2011)

in 2015.[16] South Africa and Morocco managed to improve their results slightly between 2011 and 2015 by increasing the proportion of students who passed "low" (benchmark 400) and "high/intermediate" (benchmarks 550 and 475, respectively). However, in Botswana, the proportion of students who did not even reach "low" in fact increased from 50 percent to 53 percent.

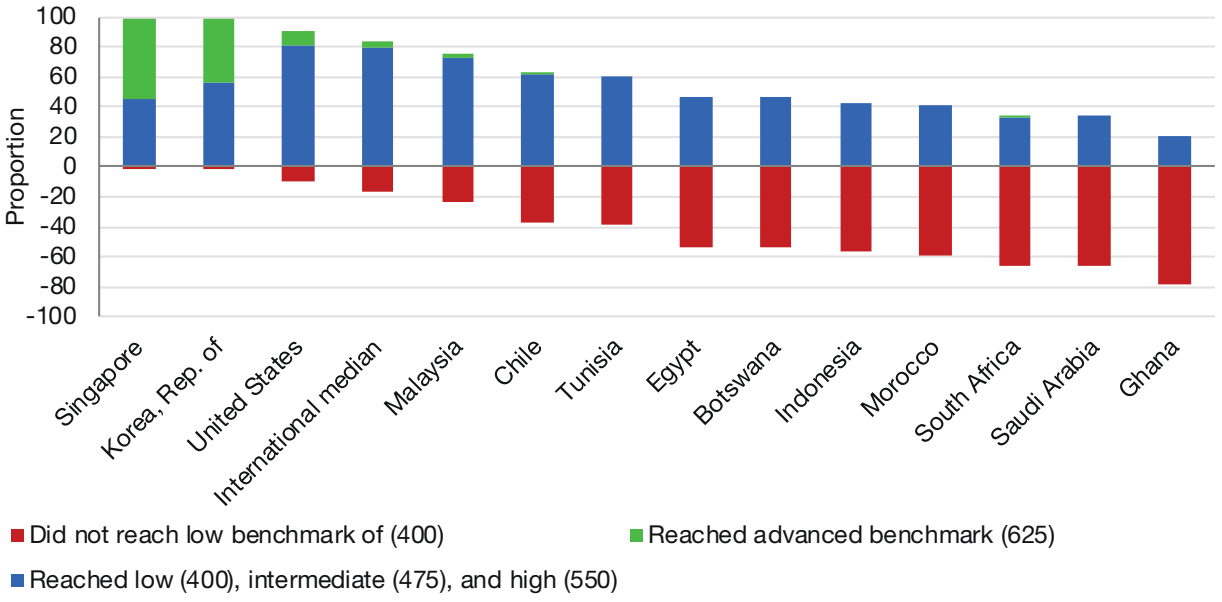
Even more important than the rankings is the size of the red bar labeled "Did not reach low benchmark of 400" in Figure 6. The bar shows the share of eighth graders[17] who did not get "beyond elementary understanding of whole numbers and basic graphs." The longer the red bar, the larger is the share of eighth graders who did not possess basic knowledge in math. In other words, they have learned little math during their eight years in school. In Tunisia, this share was the smallest at 39 percent; in South Africa, it was 66 percent, while in Ghana, as high as 79 percent.

In sum, the TIMSS results indicate that a large proportion of pupils are spending eight years in school without learning the basic math skills. This does not bode well for increased productivity and earnings—or for the economic catch-up with the rest of the world as articulated in the vision 2050 for Africa. To be sure, the TIMSS results are a call for urgent action for policymakers.

16. In 2015, 57 countries and 7 benchmarking entities (regional jurisdictions of countries such as states or provinces) participated in the fourth grade assessment, the eighth grade assessment, or both. In total, more than 580,000 students were tested in TIMSS 2015.
17. In Botswana and South Africa, ninth graders were tested instead.

The TIMSS results indicate that a large proportion of pupils are spending eight years in school without learning the basic math skills.

Figure 6: TIMSS Grade 8 assessment results in mathematics, 2015



Note: Botswana and South Africa tested ninth graders; Shana, Tunisia, and Indonesia results are from 2011.
Source: Authors' calculations based on TIMSS

Evidence from African assessments

There are two major school-based learning assessments in Africa, one in southern and eastern Africa (SACMEQ) and the other in francophone Africa (PASEC). In addition, in East Africa, a nongovernmental organization, Uwezo, carries out household-based learning tests of children between ages 6 to 16.

The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) carries out large-scale cross-national research studies in the Southern and Eastern Africa region (Figure 7 for member countries). It aims to assess the conditions of schooling and performance levels of learners and teachers in the areas of literacy and numeracy.[18] SACMEQ is like PISA, but is conducted at the regional level.

SACMEQ is a regionally benchmarked set of student assessments at Grade 6. SACMEQ results from the latest round (2007) suggest substantial shortcomings in learning achievement (Figure 8). The red bars in the chart show the proportion of test-takers in each country that does no better than basic numeracy in the SACMEQ math test. Sixth-grade pupils can recognize numbers, but they cannot do much with them—yet, these students have spent six years in school. The average proportion scoring "pre, emergent, and basic numeracy" is 60 percent of pupils, ranging from 27 percent in Mauritius to 92 percent in Zambia. Consider the ineffective use of resources, both on the household and the government sides, that results in such an unsatisfactory outcome. For most young people in Africa primary school is the only formal skill training they receive—and yet it is such poor quality. As a result, young southern and eastern Africans are coming into the labor market unprepared.

18. SACMEQ has completed three cross-national education assessments so far at five- to six-year intervals (SACMEQ I, 1995-1999; SACMEQ II, 1998-2004; and SACMEQ III, 2005-2010).

For most young people in Africa primary school is the only formal skill training they receive—and yet it is such poor quality.

Figure 7: SACMEQ member countries

Source: SACMEQ

What about learning outcomes in Central and West Africa? La Conférence des Ministres de l'Education de pays ayant le français en partage (CONFEMEN) has managed learning assessments in francophone Africa since 1993. The participating countries are shown in Figure 9. This learning assessment is called PASEC, or programme d'analyse des systèmes éducatifs de la CONFEMEN and is administered in different years in different countries to students in various grades at the beginning and at the end of the same school year.

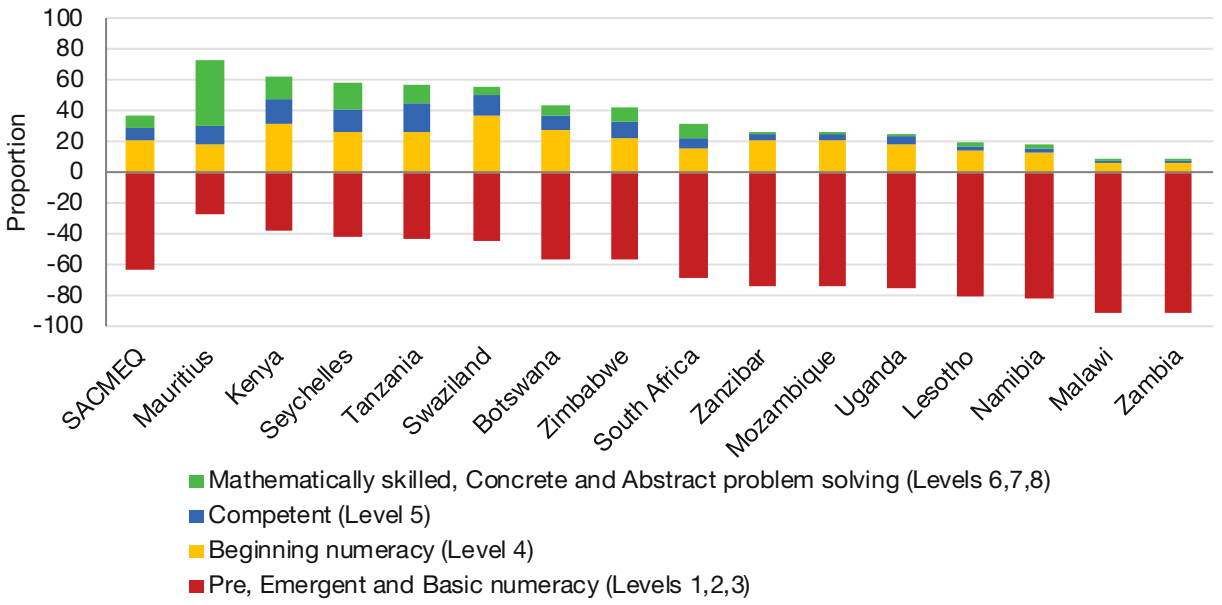
Among sixth-grade students who were tested as a part of the PASEC regional assessment in 10 francophone countries in West and Central Africa in 2014, less than 45 percent of students attained the competency level in reading or mathematics deemed "sufficient" to successfully continue their schooling.[19] The mathematics assessment results are summarized in Figure 10. On average, 40 percent of students attained the competency level in mathematics considered "sufficient," ranging from 87 percent in Burundi to 8 percent in Niger.

Lastly, Uwezo (which means "capability" in Kiswahili) is an initiative that aims to improve competencies in literacy and numeracy among 6 to 16 year old children in Kenya, Tanzania, and Uganda. The idea of Uwezo is very simple. Instead of focusing on numbers of classrooms built, teachers recruited, and books supplied, Uwezo asks the simple question "are children learning?"[20]

19. Malpel, 2016
20. Data on learning outcomes, school conditions and households were collected in 2013 in every district across the region through citizen-led household based assessments. Learning outcomes were assessed

As evident from both the international and regional learning assessments, pupils in African primary schools are not acquiring foundational skills of literacy and numeracy consistent with the official curricular requirements in their countries.

Figure 8: SACMEQ Grade 6 assessment results in mathematics, 2007



Source: SACMEQ

Like SACMEQ and PASEC, Uwezo (2013) finds that many children across East Africa are not learning basic literacy and numeracy skills. Only two out of ten pupils (20 percent) in the third year of primary school can read and do basic mathematics at Grade 2 level. By the time they reach the last year of primary school, one out of four East African children (24 percent) still have not acquired these skills.

For children aged 10 to 16, whether in or out of school, results suggest much room for improvement. In Kenya, 64 percent passed both one literacy and a numeracy test; in Tanzania the share was 48 percent and in Uganda, 36 percent. This means that, even in Kenya, the best performing country, fewer than 7 out of 10 of children aged 10 to 16 have mastered Grade 2 literacy and numeracy skills (Figure 11).

In short, as evident from both the international and regional learning assessments, pupils in African primary schools are not acquiring foundational skills of literacy and numeracy consistent with the official curricular requirements in their countries. They learn far too little. Indeed, in this regard, there really is what UNESCO calls a "learning crisis" in Africa.[21]

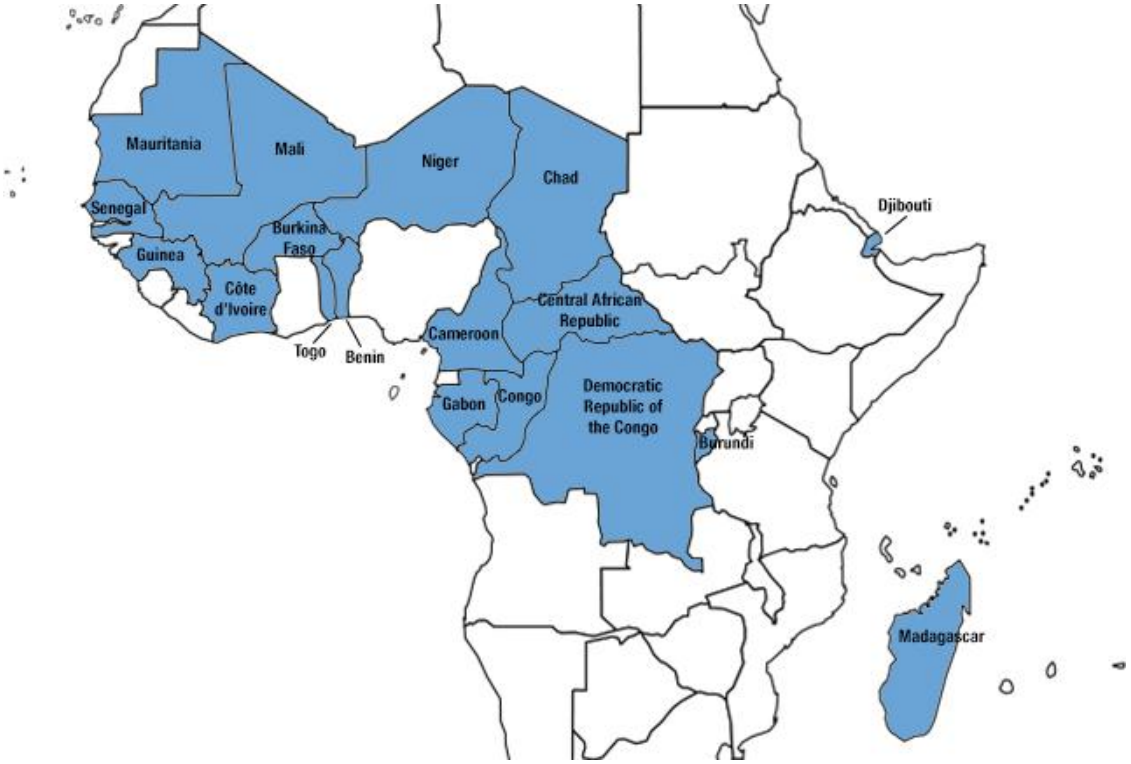
Recall that basic skills cannot be leapfrogged; they must be learned. Therefore, Africa's education agenda needs to shift decisively from quantity to quality and learning. African countries have been investing heavily in education and have achieved a vast expansion in access to schooling in a record time. Public spending continues to increase rapidly as education systems are growing, class sizes are being reduced, and post-basic education expands. But quality is severely lacking. Importantly, the quality agenda is not just about money—and, in most cases, the money is already being spent. Instead, it is about the systems of education and their reform, with emphasis on learning.

among children aged 6 to 16 through tests set at Grade 2 level.

21. UNESCO, 2013

Basic skills cannot be leapfrogged; they must be learned. Therefore, Africa's education agenda needs to shift decisively from quantity to quality and learning.

Figure 9: PASEC member countries



Source: PASEC

Service Delivery Indicators—focus on teachers

The empirical evidence in this section comes from the new Service Delivery Indicators (SDI), which are currently available only for SSA countries.[22] The SDI is an ongoing Africa-wide program to collect informative and standardized measures of what primary school teachers do, what they know, and what they have to work with (Figure 12).[23] It is a unique source of new information on the most important school-specific factor, the teacher.

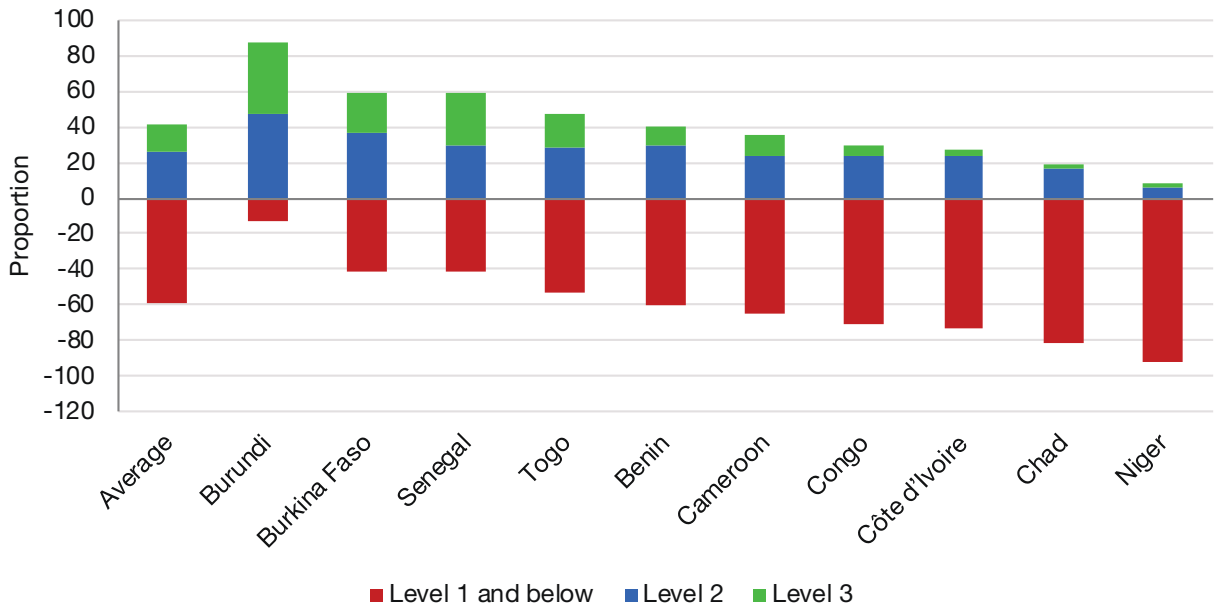
The SDI program grew out of concern about poor learning outcomes observed in the various student assessments, as well as shortcomings in the fast-expanding systems of education. These shortcomings are most distinctly manifested at the school level, hence the SDI focuses on schools. Despite the focus on schools, the "learning crisis" cannot be tackled at the school level alone. Educational achievement is not about schools or teachers alone but the entire system of education—and society.

The SDI provides a set of metrics for benchmarking service delivery performance in education (and in health care). The indicators enable identification of gaps and tracking of progress over time and across countries. It is envisaged that the broad availability, high public awareness, and persistent focus on these indicators will mobilize policymakers,

22. Morocco has also carried out an SDI-inspired survey in education but the results have not yet been finalized.
23. The SDI program is implemented in partnership with the African Economic Research Consortium (AERC), African Development Bank, and the World Bank. Funding is provided by the participating African countries, the William and Flora Hewlett Foundation, the UK Department for International Development, and the World Bank.

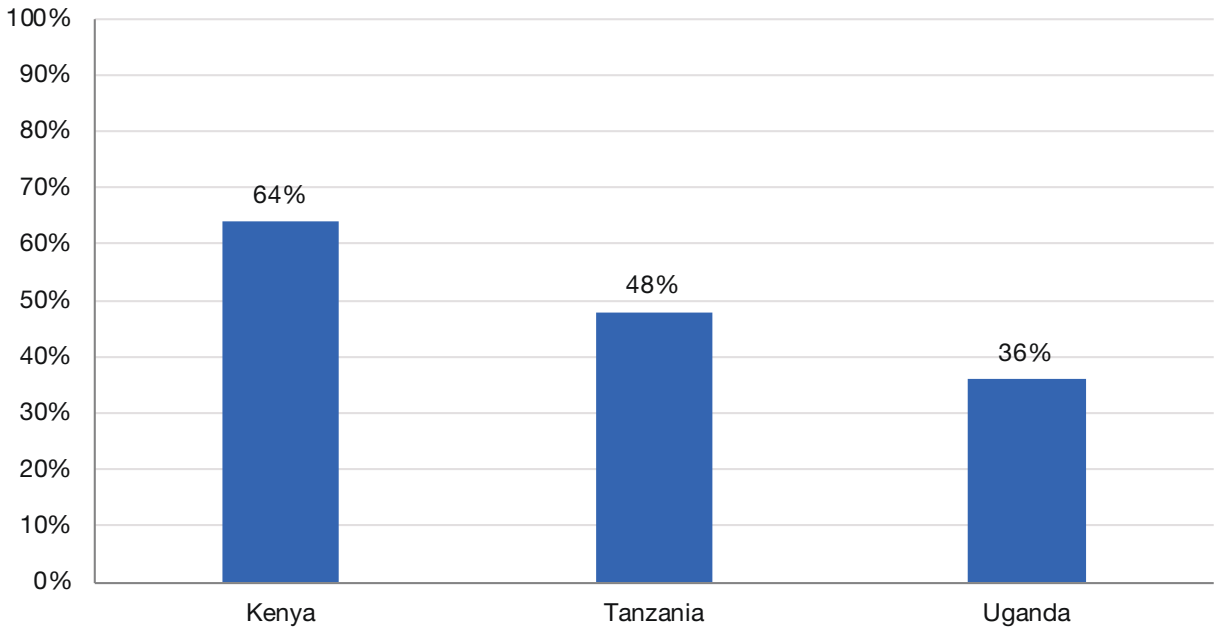
To date the SDI—or SDI-inspired nationally representative surveys—have been implemented in 11 countries in Africa, representing the service delivery experience of over 450 million people.

Figure 10: PASEC Grade 6 assessment results in mathematics, 2014



Note: "Level 1 and below" is lower than "sufficient" competency threshold to successfully continue schooling.
Source: PASEC

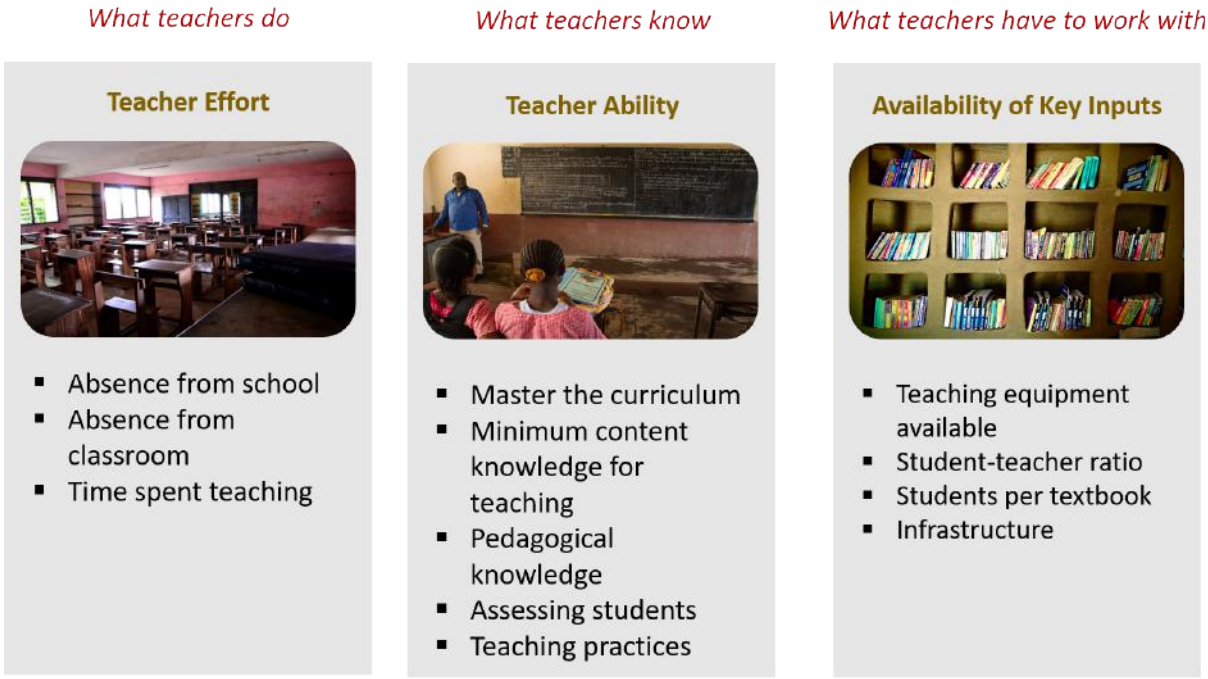
Figure 11: Grade 2 literacy and numeracy test pass rates for children aged 10 to 16, East Africa



Source: Uwezo (2013)

Data are collected through visual inspections of fourth-grade classrooms and the school premises, direct physical verification by unannounced visits (absence rate), and teacher and student tests.

Figure 12: What Service Delivery Indicators (SDI) measure



Source: http://www.sdindicators.org/

citizens, service providers, donors, and other stakeholders for action to improve the quality of services and ultimately to improve learning outcomes.

To date the SDI—or SDI-inspired nationally representative surveys—have been implemented in 11 countries in Africa, representing the service delivery experience of over 450 million people. The countries for which SDI data are available are Kenya, Madagascar, Mozambique, Niger, Nigeria, Senegal, Tanzania, Togo, and Uganda. In the SDI pipeline for 2017 are Benin, Burkina Faso, Cameroon, Democratic Republic of Congo, and the Republic of Congo (Figure 13).[24]

The surveys collect a broad set of school-, teacher-, and student-specific information, with an approach that relies as much as possible on direct observation rather than on respondent interviews. Data are collected through visual inspections of fourth-grade classrooms and the school premises, direct physical verification by unannounced visits (absence rate), and teacher and student tests. The SDI is the only available survey where both student performance and teacher effort and knowledge are measured in considerable detail and linked so that they can be analyzed together. Table A1 in the annex contains, in a summary format, a comparison of SDI results for public schools across 9 countries.

What do teachers do?

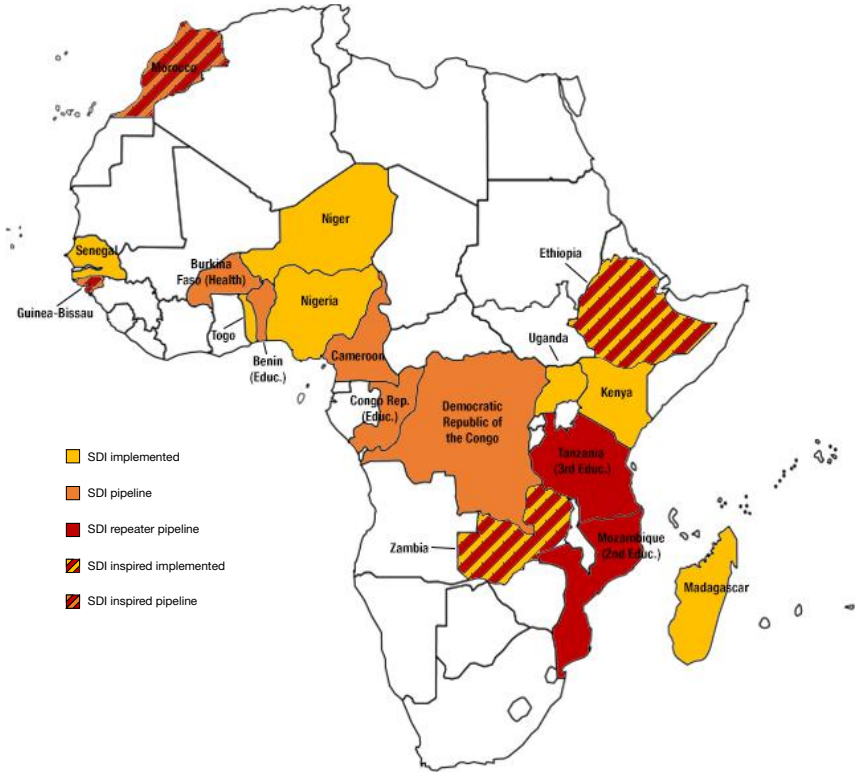
The SDI measures teacher effort using three principal statistics: absence from school,[25] absence from class-

24. As shown in Figure 13, Ethiopia and Zambia have implemented SDI-inspired surveys, while Morocco is in the pipeline as its results are currently being finalized. Mozambique will soon initiate a second round in education, while Tanzania is currently implementing a third SDI education round.

25. School absence rate is measured as the share of teachers who are absent from school at the time of an unannounced visit. During the first an-

When examining absence from classroom, we find that, 42 percent of teachers, on average, are not teaching. They are either absent from school or, even if at school, absent from the classroom.

Figure 13: Service Delivery Indicators in Africa



Source: http://www.sdindicators.org/

room,[26] and time on task or actual teaching time. As shown in Figure 14, teacher absence at the time of an unannounced visit is high in Africa. This includes teachers absent from the school, as well as teachers who are at the school but not in the classroom when they should be teaching.

On average, the absence rate from school is 20 percent, ranging from 14 percent in Tanzania to 45 percent in Mozambique. At any given time, on average, every fifth teacher is absent from school in Sub-Saharan Africa. When examining absence from classroom, we find that, 42 percent of teachers, on average, are not teaching. They are either absent from school or, even if at school, absent from the classroom. The classroom absence rate ranges from 23 percent in Nigeria to 56 percent in Mozambique and 57 percent in Uganda.

The result of absenteeism is that the actual number of hours that students are being taught is low; on average, 2 hours 53 minutes a day as compared with the average scheduled teaching time of 5 hours 31 minutes (Figure 15). The time on task is, hence, only about a half of what the statutes of education policy require.[27]

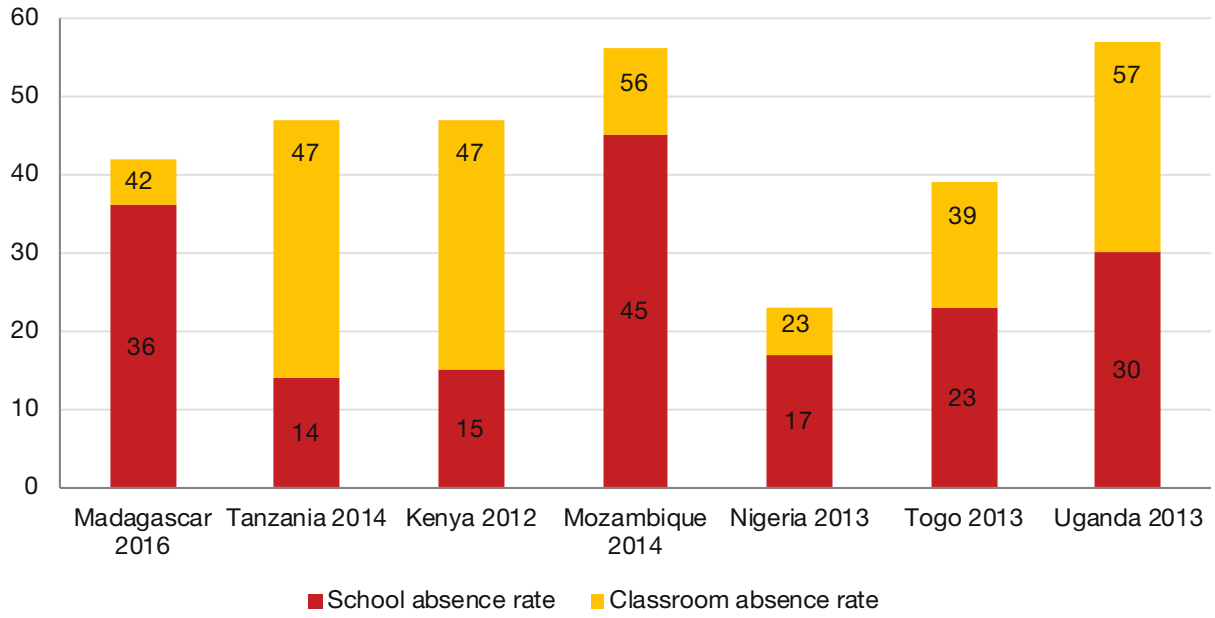
nounced visit, a maximum of ten teachers are randomly selected from the list of all teachers who are on the school roster. The whereabouts of these ten teachers are then verified in the second, unannounced, visit. Teachers found anywhere on the school premises are marked as present.

26. Classroom absence rate is measured as the share of teachers not in the classroom at the time of an unannounced visit. The indicator is constructed in the same way as the school absence rate indicator, with the exception that the numerator now is the number of teachers who are either absent from school or present at school but absent from the classroom when they should be teaching.

27. Teaching is defined very broadly, including actively interacting with pu-

The result of absenteeism is that the actual number of hours that students are being taught is low; on average, 2 hours 53 minutes a day as compared with the average scheduled teaching time of 5 hours 31 minutes.

Figure 14: Absence rates in public schools, selected SSA countries



Source: http://www.sdindicators.org/

When a large share of teachers are not teaching, unsurprisingly, a large share of classrooms are occupied by only pupils. Consistent with the findings on absence from classroom (conditional on teacher being at school), averaging across countries, one third of the classrooms were "orphaned," i.e., classrooms where students were present but there was no teacher.

What do teachers know?

For teachers to be effective, they must have the necessary content knowledge for good teaching. To assess content knowledge, the SDI survey asked language teachers to mark mock student exams in language (English, French, or Portuguese)[28] and math teachers in mathematics.[29] The mock student exam was based on the fourth-grade curriculum and consistent with the teachers' normal activities—marking student work. This approach—a mock student exam paper—also recognizes teachers as professionals in the assessment situation.

The SDI found that, in the seven countries where the survey data have been analyzed to-date, only 13 percent

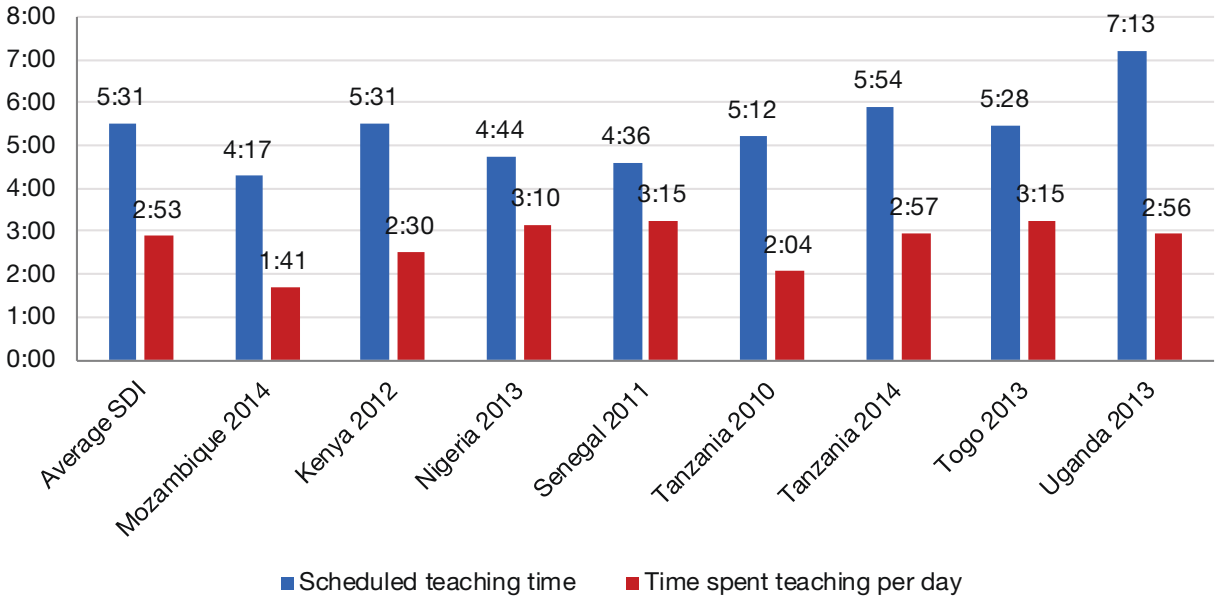
pils, correcting or grading pupil's work, asking questions, testing, using the blackboard, or having pupils working on a specific task, drilling, or memorization. Non-teaching activities include working on private matters, maintaining discipline in class, or doing nothing and thus leaving pupils not paying attention.

28. Possessing knowledge equivalent to the fourth-grade curriculum is not sufficient to teach language in lower primary, because it is difficult to teach a student how to compose even a simple text without having knowledge that goes well beyond the curriculum. The SDI, therefore, considers a language teacher in Grade 4 to have minimum subject content knowledge if he or she can confidently correct children's work in such aspects of literacy as reading comprehension, vocabulary, and formal correctness (grammar, spelling, syntax, and punctuation), all of which are competencies a teacher in lower primary would routinely be required to teach. To this end, the language test contained (in addition to the spelling and grammar exercises) Cloze passages to assess vocabulary and reading comprehension, and a letter written to a friend describing their school, which the teacher had to mark and correct. The SDI defines "minimum knowledge in language" as marking at least 80 percent of the items on the language test correctly.

29. In mathematics, a teacher has minimum subject content knowledge if he or she can accurately correct pupils' work in such aspects of numeracy as manipulating numbers using whole number operations. This requirement amounts to correctly scoring 80 percent or more of the questions on the lower primary portion of the mathematics test. In essence, the test measures whether the math teacher masters his or her students' curriculum, allowing for 20 percent points margin of error.

It is evident that teacher knowledge in SSA is far below what it should be—and what is expected by policymakers, employers, and parents.

Figure 15: Scheduled teaching time and actual time spent teching, selected SSA countries



Source: http://www.sdindicators.org/

of language and math teachers possessed what can be considered minimum knowledge to teach the curriculum they were teaching. As depicted in Figure 16, only 0.1 percent of Grade 4 teachers in Madagascar scored more than 80 percent on the language and mathematics curriculum compared to 40 percent in Kenya.

Teachers' test scores of language, mathematics, and pedagogy combined are shown in Figure 17. Average score is 42 percent, while the test results range from 57 percent in Kenya to 27 percent in Mozambique. The weakest area is pedagogy.

It is evident that teacher knowledge in SSA is far below what it should be—and what is expected by policymakers, employers, and parents. While systematic teacher test results do not exist from the past, it seems that the mass expansion of the teaching force during the last two decades have come at the cost of teacher quality.

How much do teachers matter for learning?

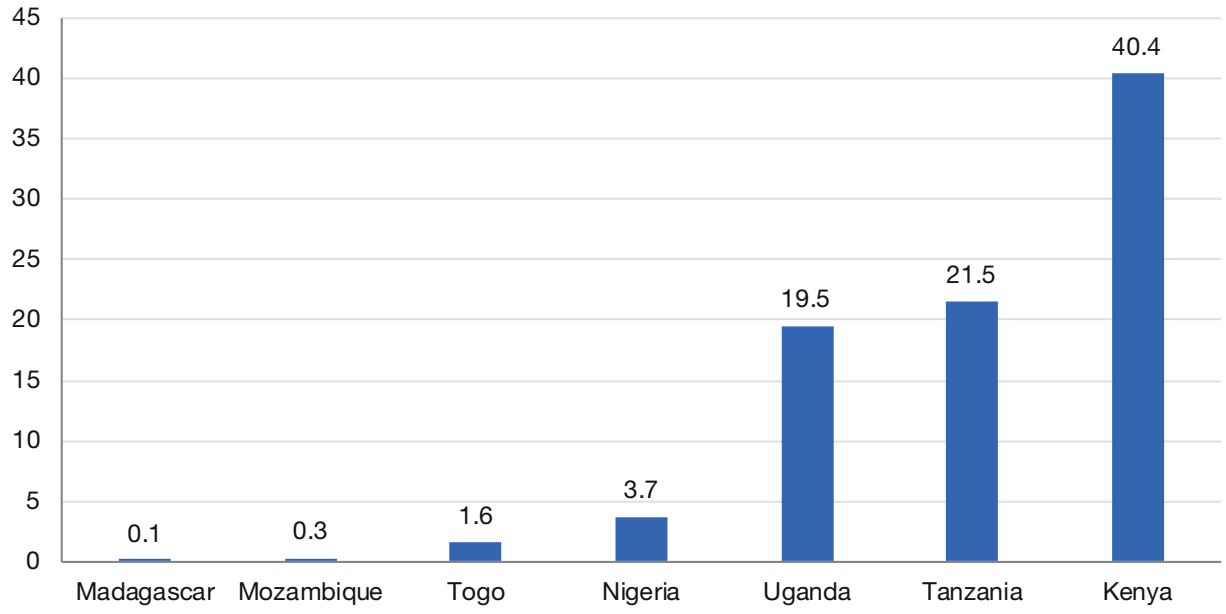
The SDI is unique in that it collects both student and teacher test data and thus allows empirical examination of the extent to which teacher quality matters for student learning in Africa. In other words, one can ask whether—and to what extent—students' academic performance would increase if they were taught by better teachers, specifically, by those with higher content knowledge and greater pedagogical knowledge and skills.

Analysis of the SDI data finds large positive effects of teacher's good content knowledge and pedagogical knowledge and skills on student learning.[30] Specifically, moving a student from a teacher with little content or pedagogical knowledge and few pedagogical skills to a teacher with high scores on these three dimensions would raise student test scores by 1.1 standard deviation. This is a very large increase and would make a big difference for learning—more or less the quantum leap that the learning

30. Bold et al., 2016

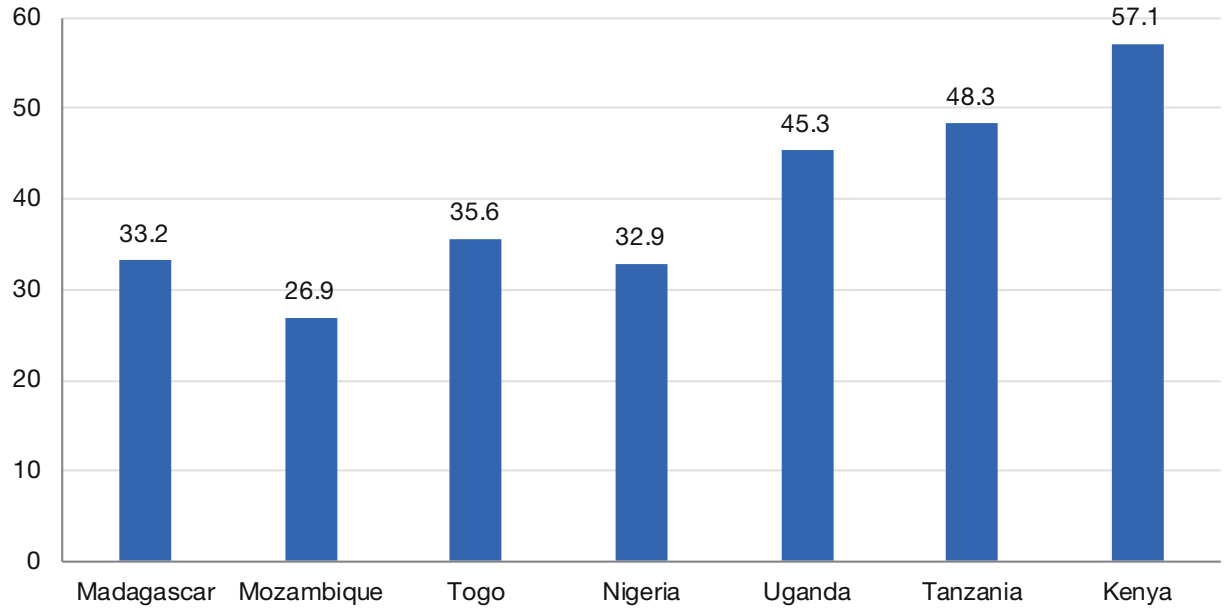
Analysis of the SDI data finds large positive effects of teacher's good content knowledge and pedagogical knowledge and skills on student learning.

Figure 16: Teacher knowledge in public schools: Minimum knowledge in language and math



Source: http://www.sdindicators.org/

Figure 17: Teacher test scores: language, mathematics, and pedagogy combined



Source: http://www.sdindicators.org/

Reforms that create a situation where students are taught by teachers with at least minimum subject (content) knowledge and minimum pedagogical knowledge and skills would make it possible to take a quantum leap and considerably improve student learning in Africa.

assessments suggest is needed. In comparison, in randomized controlled trials, which have been carried out on numerous education interventions, an impact 0.1 to 0.2 standard deviations is often considered a large impact.

These findings strongly suggest that reforms that create a situation where students are taught by teachers with at least minimum subject (content) knowledge and minimum pedagogical knowledge and skills would make it possible to take a quantum leap and considerably improve student learning in Africa.

How do private schools compare to public schools?

Private schools account for around 20 percent of total primary school enrollment in low-income countries.[31] Contrary to common perception, most of these private schools are informal and low-cost. According to the SDI data, African private schools tend to perform better than public schools.[32] Their teachers tend to exert more effort, show more knowledge, and exhibit better teaching practices than their public sector counterparts (Table 1).

Yet, private schools are not able to overcome many of the same problems faced by public schools—these problems seem to be systemic. Indeed, even in the private sector, close to one third of teachers are absent from the classroom. While teachers' time on task—i.e., the length of the actual school day—is four hours, on average (rather than the 2 hours and 53 minutes in public schools), it is still two hours shorter than the scheduled time. In addition, while teachers in private schools have significantly higher test scores, their pedagogical knowledge is almost as weak as that of public school teachers.

Analysis shows that the better performance of private school teachers is reflected in learning outcomes.[33] The student score in mathematics and language is between one-third and two-thirds higher in private schools. The reading comprehension score of a private school student is three times as high as those of public school students. However, at least some of the better performance may be due to sorting of more capable students to private schools and not only because of better-performing teachers.

31. Baum et al., 2014
32. Bold et al., 2016
33. Bold et al., 2016

Table 1: Comparison of public and private schools

	Public	Private
Teachers		
Absence from class (%)	48	28
Time spent teaching	2h 48m	4h 2m
Score Language	49	55
Score Mathematics	50	58
Score Pedagogy	23	25
Good practice in the classroom	9	12
Students		
Score Language	44	73
Score Maths	42	56
Score NVR	54	61

Note: Data covers Kenya, Nigeria, Togo and Uganda where private school samples are available. Therefore, averages differ slightly from other tables and figures presented in this paper.
Source: Bold et al. (2016)

Improvement in learning requires reforming the entire system of education. Such reform needs to go well beyond the education ministries and those reporting to them—it is a project for the whole of society.

A comparison of student test scores in the SDI

Lastly, we compare student test scores in mathematics in the best, average, and worst schools in three countries where the SDI survey has been implemented: Kenya, Nigeria, and Uganda. The best schools are defined as belonging to the top decile of teacher presence and subject (content) knowledge and in the bottom decile of pupil-teacher ratio. Average schools are in the middle of the distribution, while the worst schools are at the opposite end from the best schools.

Comparison of SDI results across Kenya, Nigeria, and Uganda reveals large differences (Figure 18). While Ugandan top schools fare better than the best schools in the other two countries, within-country differences in test scores between Uganda's best and worst performing schools are much larger (50 points out of 100) than those in Kenya (14 points) or Nigeria (24 points). Looking across the three countries, it is remarkable that student test scores in mathematics in Nigeria's best schools are lower than Kenya's worst schools.

Conclusions and an action agenda

Africa has largely accomplished the goal of universal enrollment of children in primary school, although significant regional and social pockets of disadvantage remain and completion rates need to improve. The next priority is improving the quality of learning in school so that children emerge equipped with the education they need to address the challenges of the complex economic, social, and political world they face. This is also what was agreed in the United Nations for the sustainable development goal number four.

This education update for the vision 2050 for Africa emphasizes the centrality of quality. Until recently, attention has been mostly on increasing access to education. In the past two decades, most countries in Africa have effectively used increased financial resources—both domestic and external—to expand school participation for all. Today Africa spends a similar share of its GDP and public spending on education as OECD countries. A fast-growing population and new demands for post-primary education will continue to require increasing resources in the future, too. In order to achieve this, both continued economic growth and selectivity are critical.

Improving quality is not just a question of money. Rather, it is about putting the focus squarely on learning. How can this be done? First, one must start with measurement. Regular learning assessments—either international or regional—should become the norm. Currently, learning is measured at best sporadically. For example, SACMEQ in Southern and Eastern Africa was last carried out in 2007. Few African countries participate in international learning assessments, such as TIMSS or PISA. This state of affairs should change. Similarly, in the next update for the vision 2050 for Africa relevant quality targets should be developed.

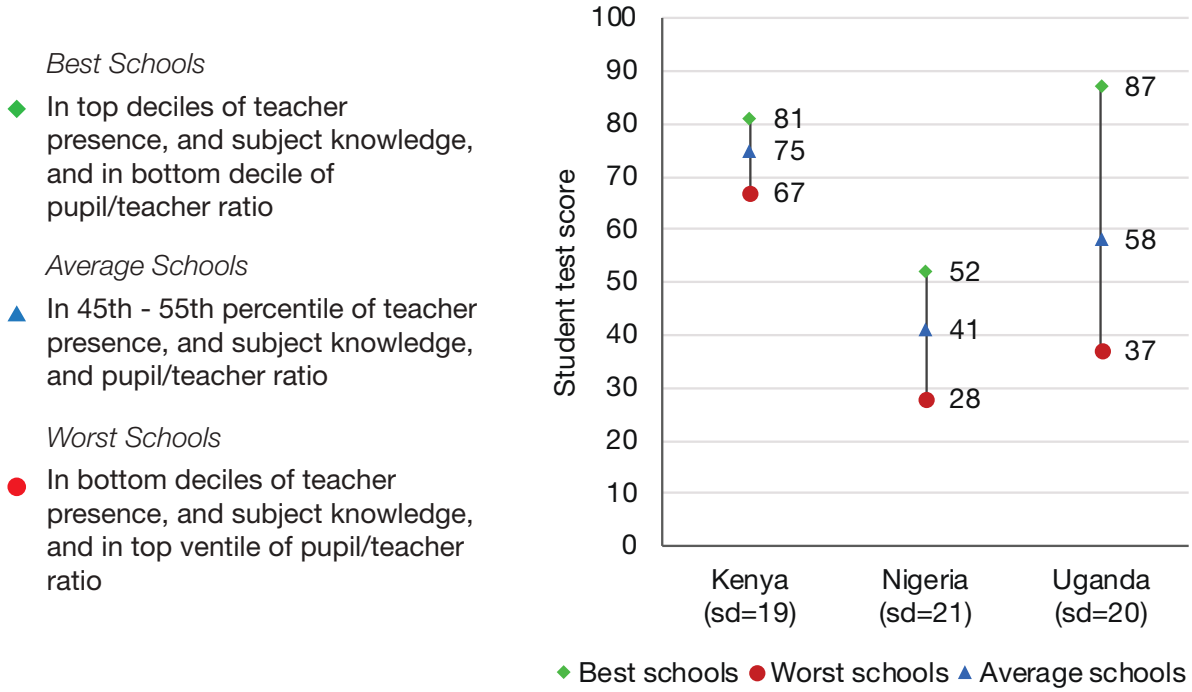
Second, improvement in learning requires reforming the entire system of education. Such reform needs to go well beyond the education ministries and those reporting to them—it is a project for the whole of society. There is, unfortunately, no silver bullet, technical fix or intervention that will do it. Instead, such a reform needs to strengthen the relationships of accountability between national and local politicians, education service providers, and parents. It is about politics, incentives, and empowering parents and other stakeholders, all with the focus on quality and learning.

While student learning assessments and the SDI data on teachers provide a detailed nationally representative diagnosis of the problem at the school level, finding solutions will require national dialogue, consensus building, and continued monitoring of progress. Just calling for more funding for education will no longer do.

Third, it is important that education is broad-based with universal basic education and at least 80 percent secondary and 35 percent tertiary enrollment, as envisioned in the vision 2050 for Africa. In order to achieve broad-based learning, countries cannot ignore the systemic failures

It is not just the average test scores—or the top test scores—that matter for economic growth but also the bottom scores.

Figure 18: Student test scores in best, average, and worst schools in mathematics



Source: http://www.sdindicators.org/

and focus on, say, science, technology, engineering, and mathematics—the so-called STEM subjects—for the elite group of students. It is not sufficient just to have a group of well-educated students who will take the country forward. Without broad-based education, much talent would be lost if poorer children did not get an opportunity to learn basic skills and beyond. The same would be the case if girls were not able to access good education. This large talent pool could not be harnessed for national productivity—and many would be condemned to the cycle of poverty. Empirical evidence supports this argument. Namely, it is not just the average test scores—or the top test scores—that matter for economic growth but also the bottom scores.[34]

This update emphasizes two other related aspects, or basic premises. First, that basic skills cannot be leapfrogged, they must be learned. Learning assessments reviewed in this paper demonstrate unequivocally that students are not learning anywhere near what they should be learning according to countries' education policies and plans.

Second, the teacher is the most important school-related factor in education. It is evident from the new SDI data that teacher effort and knowledge in SSA is far below what it should be—and what is expected by the continent's policymakers, employers, and parents. The SDI surveys provide unique and policy-relevant evidence on what teachers do and know—such test results have not been available in the past. It seems clear that the mass expansion of the teaching force during the last two decades in Africa has come at a high cost of teacher quality.

34. Hanushek and Woessmann, 2015

Education systems need to develop and support good teachers in a much more comprehensive and effective way than is the case today.

The SDI data also show that, when taught by teachers with at least minimum subject knowledge and pedagogical knowledge and skills, student test scores are vastly better. Thus, it is indeed possible to take a giant leap in quality of education and greatly improve student learning in Africa.

Lastly, while we have explored the problem of poor learning with the focus on teachers, it is important to point out that the issues raised in this paper reflect system-wide problems, not just teacher-specific ones. Solving them calls for system-wide solutions. Most teachers enter their profession with intrinsic motivation and desire to help students learn. An important message is, therefore, that the education systems need to develop and support good teachers in a much more comprehensive and effective way than is the case today.

Annex

Table A1: Comparison of SDI results across countries (public schools)

	Madagascar 2016	Tanzania 2014	Average SDI	Kenya 2012	Mozambique 2014	Nigeria* 2013	Senegal 2011	Tanzania 2011	Togo 2013	Uganda 2013
Teacher Ability										
Minimum knowledge (At least 80% in language and mathematics)	0	21.5	12.7	34.8	0.3	2.4	Not comparable	Not comparable	0.9	19.4
Test score (language, mathematics, and pedagogy)	32.1	48.3	42	55.6	26.9	30.5	Not comparable	Not comparable	33.9	45.5
Teacher Effort										
School absence rate	35.9	14.4	20.1	15.2	44.8	16.9	18	23	22.6	29.9
Classroom absence rate	42.2	46.7	42.1	47.3	56.2	22.8	29	53	39.3	56.9
Scheduled teaching time	5h 03min	5h 54min	5h 31min	5h 31min	4h 17min	4h 44min	4h 36min	5h 12min	5h 28min	7h 13min
Time spent teaching per day	2h 56min	2h 46min	2h 53min	2h 30min	1h 41 min	3h 10min	3h 15min	2h 04min	3h 15min	2h 56min
Availability of Inputs										
Observed pupil-teacher ratio	16.9	43.5	42.1	39.3	21.4	21.5	27.2	52	31.4	53.9
Share of pupils with textbooks	6.8	25.3	37.2	44.5	68.1	33.7	18	19.7	76	6
Minimum equipment availability (90% with pencils and notebooks)	65.1	61.4	57.8	74.3	76.8	48.2	Not comparable	Not comparable	24.3	79.5
Minimum infrastructure availability	16	40.4	36.2	60.2	29.1	13.4	Not comparable	Not comparable	14.4	57.2
Pupil Learning										
Test Score (out of 100) (language, mathematics)	46.6	40.1+*	45.4	69.4	20.8	25.1	Not comparable	Not comparable	38.1	45.3
Language test score	39.7	36.5+*	44.8	72.5	18.7	23.3	Not comparable	Not comparable	36.9	43.4
Mathematics test score	53.5	58.2	45.2	57.4	25.1	28.2	Not comparable	Not comparable	41.3	41.7

Note: Values for Nigeria are the weighted average of the four states surveyed, namely Anambra, Bauchi, Ekiti, and Niger.
Source: http://www.sdindicators.org/

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