Measuring ICT in education in sub-Saharan Africa: A call for action

Peter Wallet, Programme Specialist in ICT in education statistics at the UNESCO Institute for Statistics gives us an overview of the latest ICT in education data collected by the UIS.

Information and communication technology plays an ever-important role in increasing economic performance through digital economies, enhancing the delivery of public and private services, and achieving broad socio-economic goals in education, healthcare, employment and social development. As a result, countries are advancing ICT policies to underpin growth in a variety of socio-economic sectors and help steer economic competition. However, given the rapidly evolving ICT landscape, as a result of emerging technologies, systematic examination and evaluation of stated policies is essential.

The UNESCO Institute for Statistics (UIS) is mandated to administer international data collections on the availability, use and impact of ICT in education. Through the establishment of internationally-comparable and policy-relevant indicators, the UIS contributes significantly to international benchmarking and monitoring of the integration of ICT in education, which are fundamental for policymakers to select priorities and adopt and develop policies.

Mind the data gap

The most significant obstacle in measuring ICT in education in sub-Saharan Africa is the lack of systematic data collection. Several countries do not currently carry out data collection and for those that do their efforts are in their infancy. In fact, in response to recent UIS survey amongst sub-Saharan African countries Angola, Benin, Central African Republic, Democratic Republic of Congo, Djibouti and Somalia all reported that at the current time (2013/2014), no systematic data collection on ICT in education existed at the national level.

The existence of systematic data collection typically reflects national priorities and in many countries in sub-Saharan Africa, the integration of ICT is a low priority when compared to other objectives including increasing enrolment rates, decreasing the proportion of out-of-school children, and ensuring adequate numbers of trained teachers. Furthermore, the integration of ICT in education is occurring relatively slowly in many countries due to a number of factors including a lack of formal policy, financial resources, basic infrastructure, and teachers with appropriate skills. Due to a general lack of data on ICT in education, this article will elaborate three specific aspects related to school's ICT infrastructure for which data are more commonly available:

1) Electrification

2) Computer density

3) Internet connectivity

Data on these three concepts provide some insight as to where ICT in education is feasible as well as where significant obstacles hinder expansion.

Photo: Vera Obiakor

Electrification of schools

While battery-operated mobile devices that can be recharged off-site (e.g. smart phones, tablets) have the potential for supporting instruction, most devices including television, desktop and laptop computers and the internet continue to require a more stable energy source. In other words, the integration of ICT in schools requires electricity that is regularly and readily available. In many developing countries, however, rural, remote and mountainous regions are frequently neglected in national infrastructure plans. Moreover, even when schools are connected to an electrical grid, power surges and brownouts are common in both rural and urban areas, further impeding the reliable usage of ICT. (Mudenda, et al., 2014; Practical Action, 2013).

According to Figure 1, electricity is not frequently available in primary schools in Guinea, Lesotho, Burkina Faso and Cameroon, where fewer than 20% have an electrical supply. It is extremely rare in both Madagascar and Niger where fewer than 5% of primary schools are connected — 2% and 4%, respectively. In contrast, more than three-quarters

of primary schools have an electric supply in Djibouti, Botswana, South Africa and São Tomé and Príncipe. In Mauritius, all primary institutions have electricity. Figure 1 also shows that secondary schools typically have relatively higher rates of electrification. This is most evident in Niger and in Zambia where 77% and 100% of upper secondary schools have electricity, respectively, compared to 4% and 16% in primary schools. In Liberia, where data cannot be disaggregated by school level, only 6% of primary and secondary schools combined have electricity.

Computer density

In order to support instruction using computers and online tools and content, sufficient computer density must be established, keeping pace with demand based on enrolment. Computer density can be measured using the pupil (learner)-to-computer ratio (LCR), which refers to the mean number of pupils sharing a single computer available for pedagogical use in national aggregate education systems. While the LCR sheds light on current infrastructure

to support eLearning, national-level LCRs mask sub-national differences within a single country (i.e. digital divide). In general, computers are very

Secondary schools typically have relatively higher rates of electrification

unevenly spread within African countries with computers typically being concentrated in relatively few schools that already have the basic infrastructure to support them.

Figure 2 shows that computer resources are greatly overstretched in primary education in a number of countries including the Gambia, where 277 pupils on average share a single computer. Computers are especially overstretched in primary schools in Zambia and Guinea where there are more than

Figure 1: Electricity in educational institutions, primary and secondary, 2013
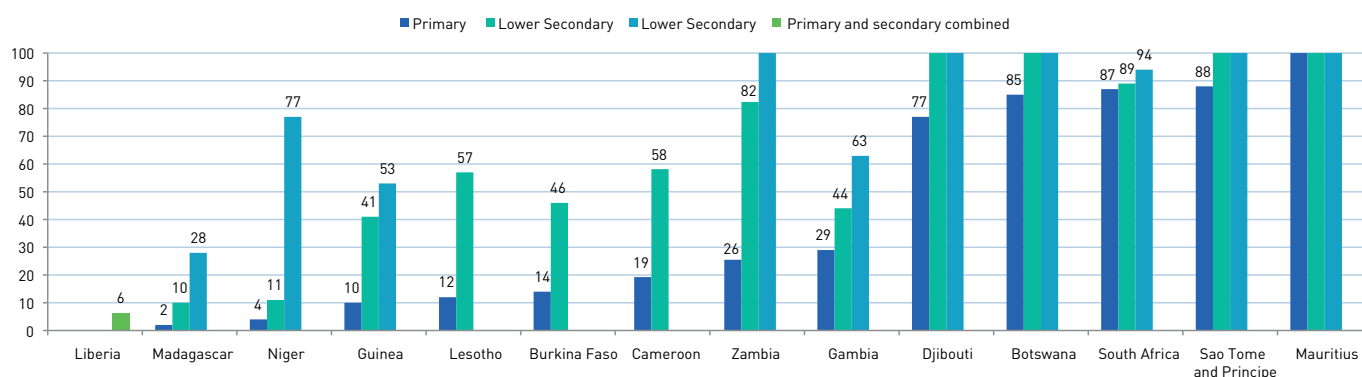
Source: UIS Statistical database, 2015.

Notes: m = missing data. Data from Botswana and South Africa represent public schools only. Secondary data for Lesotho, Burkina Faso and Cameroon represent combined lower and upper secondary levels. Data for South Africa reflect 2011; data for Zambia and Botswana reflect 2012; and data for Gambia and Mauritius reflect 2014.

500 pupils per computer. While the LCR is an average, computer resources may, however, be so strained in many schools that time on task is too limited per pupil to allow a meaningful learning experience. While no country provides evidence of high computer density among pupils, some countries have made progress to lower their LCR. The primary level LCR in South Africa, Botswana, Rwanda and Mauritius is 90:1, 55:1, 40:1 and 23:1, respectively. In Rwanda, computer density is high partly due to its involvement with the One Laptop Per Child (OLPC) programme, which included the distribution of more than 150,000 low cost laptop computers to approximately 11% of Rwanda's primary schools (Rwanda, 2012).

According to Figure 2, data are more frequently available for secondary education, which might reflect countries' tendency to prioritise ICT in secondary education compared to primary education. In the Gambia, the LCR decreases from 277:1 in primary education to 66:1 and 37:1 in lower and upper secondary education, respectively; while, in South Africa, the LCR decreases from 90:1 in

primary education to 54:1 for combined secondary. In other countries, evidence shows that LCRs remain very high in secondary education. For example, there are more than 500 learners on average sharing a computer in lower secondary education in Guinea, Madagascar and Niger, while at the upper secondary level the LCR in Niger decreases to 94:1, yet remains at >500:1 in Guinea and Madagascar. Rwanda remains an exception to other countries in the region in that the ratio for both primary and secondary levels is the same at 40:1.

Internet to support online learning

Online or web-based learning refers to an interactive learning method using content from the World Wide Web. Ministries of Education often have little or no control over school internet connectivity as this depends to a great extent on the level of development of the national telecommunications infrastructure and access to a reliable power supply (UIS, 2014; World Bank, 2010).

500 or more
learners on average sharing a computer in lower secondary education in Madagascar and Niger

Figure 3 shows the proportion of schools with internet; however, the data do not represent the proportion of schools that use internet for pedagogical purposes, but rather those that have internet for pedagogical and/ or administrative use. Moreover, the data do not provide information on bandwidth and therefore data may represent a combination of schools with both broadband and narrowband.

Internet availability ranges substantially within sub-Saharan Africa. For example, internet availability is negligible in primary schools in Liberia, Madagascar, and Guinea while being just slightly more available at the secondary level — 1% of combined secondary schools in Burkina Faso, 3% of upper secondary

Figure 2: Pupil (learner)-to-computer ratio, primary and secondary, 2013
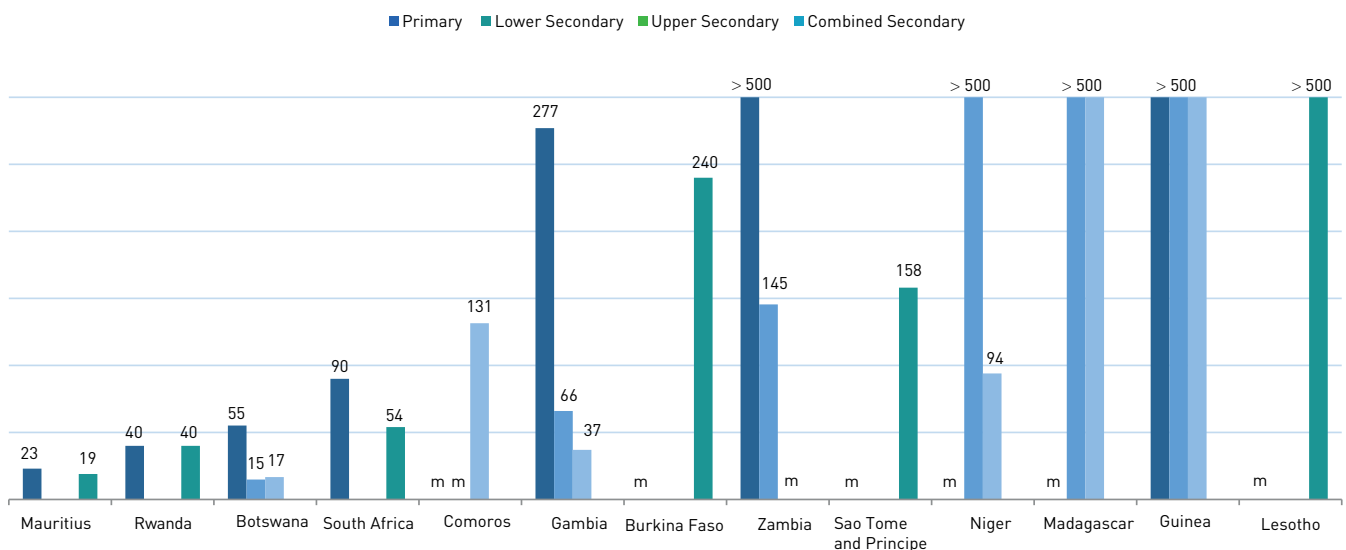
Source: UIS Statistical database, 2015.

Notes: m = missing data. Data from Botswana reflect public sector schools only. Data from South Africa reflect 2011; data from Rwanda, Botswana and Zambia reflect 2012; and data from the Gambia and Mauritius reflect 2014.

Looking forward: Better data for better policymaking

ICT use in education is at a particularly embryonic stage in the majority of countries in sub-Saharan Africa and there are few data available to shed light on the level of integration in both primary and secondary education. Nevertheless there are new developments and announcements related to ICT in education happening on an almost daily basis across the continent. This article should be regarded as a "snapshot" of available resources to support ICT in education across a number of countries in the region; however collecting more and better quality statistics from sub-Saharan Africa should be a priority in the post-2015 context as ICT is expected to play an increasing role in any future education goals. Data on device type, broadband internet, and other key aspects will be important to help shape policymaking as ICT expands across African education systems. Therefore this article should also be considered as a call for action on the part of Ministries to mainstream the collection of ICT in education data in their regular school census reporting.

portion of schools with internet is 2% and 14%, respectively. At the other end of the range, Mauritius has connected 93 and 99% of primary and secondary schools, respectively, while Botswana has connected all public secondary schools to the internet. Data for primary schools in Botswana are not available.

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schools in Madagascar, and in 3% and 5% of lower and upper secondary schools in Guinea, respectively. In Niger the proportion of primary schools with internet is unknown; however in lower and upper secondary schools the pro-

Figure 3: Proportion of educational institutions with internet, primary and secondary, 2013
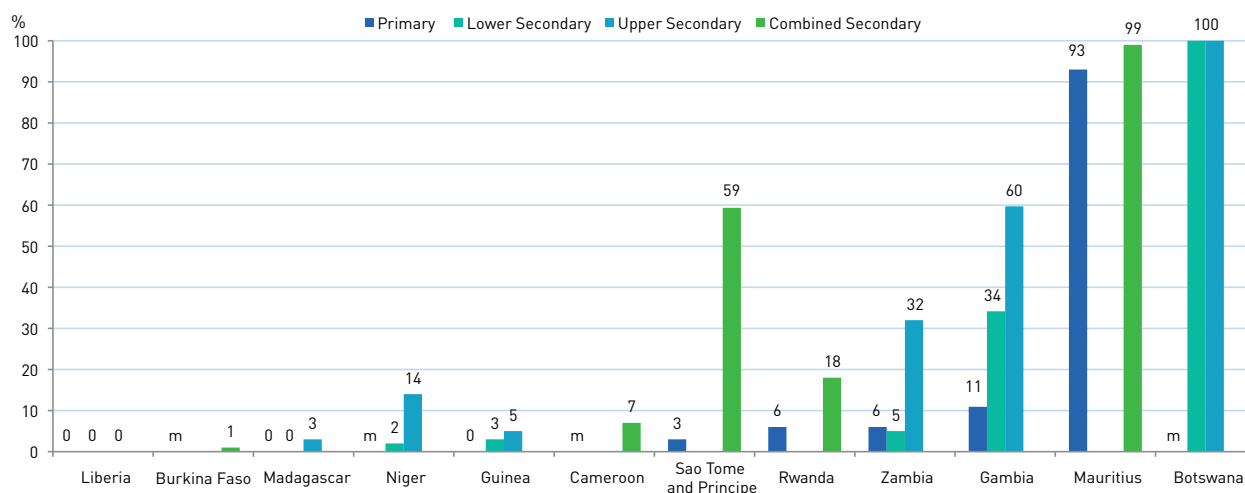
Source: UIS statistical database, 2015.

Notes: m = missing data. Data for Botswana, Burkina Faso, Madagascar and São Tomé and Príncipe reflect public institutions only. Data from Zambia, Rwanda, and Botswana reflect 2012; data for Gambia, Liberia and Mauritius reflect 2014.