In poor countries technology can make big improvements to education

Teachers are often unqualified, ignorant or absent; tablets show up and work

Mindspark

Print edition | International

Nov 15th 2018| NAIROBI AND GHANGHU

At kicoshep school in Kibera, a vast Nairobi slum, Grade 3 is learning English. The teacher, Jacinter Atieno, asks questions about a story on the exploitation of children as domestic servants. At the back of the class, a coach logs information about Mrs Atieno's performance into a tablet. Halfway through the class, the coach summons three children and tests their reading. The scores go into the tablet, which then makes suggestions—that, say, Mrs Atieno might watch one of its instructional videos, or improve her English pronunciation with its letter-sound tool. The information is uploaded to the county office that runs the local schools, and can be reviewed by the teachers' bosses there.

This is Tusome—"let's read", in Kiswahili—in action. A huge programme, funded by usaid to the tune of $74m over five years, it has been adopted by the Kenyan government and is used by 3.4m children in 23,000 government primary schools and 1,500 private schools. The coach-and-tablet element is just one part. A curriculum based on synthetic phonics (widely used in developed-country schools) has been designed and 23m books distributed, along with detailed lesson plans to make life easier for teachers. But the technology is crucial to supporting them and providing their bosses with data about their performance. Mrs Atieno is surprisingly enthusiastic: "I love the coach. When I have a problem I can tell her and she comes to help me."

Cheap and cheerful

The costs are low—around $4 a child a year—and the results impressive. In the first year of Tusome's operation, the proportion of Grade 2 pupils who could read at 30 words per minute (wpm) rose from around a third to two-thirds. Yet by rich-world standards these levels are poor: Americans are expected to read at 60wpm by the beginning of Grade 2 and 90wpm by the end. Even accounting for the difficulty of using a second language, the gap in attainment in rich and poor countries, even at the earliest stages, is staggering.

Thanks in part to the challenge set by the Millennium Development Goals, almost all primary-age children almost everywhere in the world are now in school. But in many of those schools children are learning next to nothing. Research by the World Bank in seven sub-Saharan African countries, for instance, has found that half of Grade 4 students cannot read a simple word; almost three-quarters cannot read all the words in a simple sentence; 12% cannot recognise numbers; 24% cannot add single digits; and 70% cannot subtract double digits. It is not just Africa. A recent study in India shows that 38% of Grade 3 children in government schools cannot read simple words, and only 27% can do double-digit subtraction.

The big problem is teachers: often too few, too ignorant—or simply not there. Unannounced visits to classes across seven sub-Saharan African countries by the World Bank found that in nearly half of them, the teacher was absent. Many teachers who do turn up are startlingly underqualified. In Bihar in northern India, for instance, only 11% of government-school teachers could solve a three-digit by one-digit division problem, and show the steps by which to do it.

The moneyed classes

Primary-school teacher salaries as a multiple of GDP per person
Selected countries, latest available

	0	1	2	3	4	5	6	7
CAR								
Ethiopia								
Kenya								
South Africa								
Nigeria								
India*								
Tanzania								
Germany								
Britain								
United States								

Source: Centre for Global Development   *Rural Andhra Pradesh

Paying teachers more is not likely to improve the situation. As research by Justin Sandefur of the Centre for Global Development shows, poor-country teachers tend to be remarkably well-paid, by local standards

(see chart). And evidence from countries as diverse as Indonesia and Pakistan suggests that teachers' pay levels have little impact on learning. Ideally, governments would invest in training teachers properly and promote or fire them on the basis of their performance. But the first of these ambitions requires levels of governance lacking in many developing countries, and a time-horizon beyond that of many elected governments. The second is often politically unrealistic: teachers' unions can be exceedingly powerful outfits for a range of reasons—including that polling stations are often located in schools and run by teachers.

Tech is not a substitute for well-qualified, motivated teachers, but—used appropriately—can mitigate the problems. The qualifier is important. In 2006 Nicholas Negroponte, founder of the mit media lab, launched the One Laptop Per Child (olpc) initiative to put computers in the hands of the world's poor children, saying: "We will literally take tablets and drop them out of helicopters." They did not, literally; but even when cheap laptops were delivered (by road) to poor-country schools, they did not improve learning levels. In Uruguay, for instance, 1m were distributed, but they had no impact on test scores.

Anti-dumping duties

olpc illustrates what Michael Trucano, ed-tech specialist at the World Bank, regards as a basic law of tech interventions: "If you dump hardware in schools, and expect something magical to happen as a result—it won't." But he also believes that "successful systems are the ones that fail, learn quickly from failure and make improvements based on what's been learned."

Recent studies suggest that some places are at last getting it right—and that tech helps most in poor countries. A survey of ed-tech initiatives around the world by George Bulman and Robert Fairlie of the University of California, Santa Cruz, published by America's National Bureau of Economic Research, a think-tank, found that "evidence of positive effects appears to be the strongest in developing countries".

They suggested this might be because "the instruction that is being substituted for is not as of high quality in these countries."

Tech can help solve many of the problems that developing-country education systems face. Take teacher absenteeism. The data the Tusome coach logs into her tablet, combined with gps, tell the county education director whether the teacher and the coach were on duty. Some counties do nothing with the data; some use it to hold educators accountable. (Teachers are not fired—their union is too powerful—but some coaches have been.)

Technology can also help teachers manage a wide range of abilities in a class. In India, for instance, more than half of those in Grade 5 cannot read at Grade 2 level. If children never learn to read properly, they are doomed economically. In a big test among randomly selected children in government schools in Delhi, Mindspark, an interactive software developed in India, has been shown to make a big difference. It sets students work suitable to their level. The weakest children benefited most. If software can help stop children from dropping through the net, that is a massive gain.

Tech can also ease the burden of overloaded teachers. Interactive software produced by onebillion, a British non-profit group, has been tested in Malawi, where the average primary-school class has 76 pupils in it. Andrew Ashe, onebillion's co-founder, says he has seen a class of 250. For the onebillion trial, children were taken out of their huge classes, put in groups of 25 and given tablets loaded with maths software; similar-sized groups were given tablets without the maths software, to control for the possibility that children might benefit from any instruction given in smaller groups. Those with the maths software made significant gains.

Onebillion's software is among five systems undergoing the toughest test of all: teaching children in the absence of any teachers. They are finalists in the Global Learning XPrize, sponsored by Elon Musk, a Silicon Valley mogul. They are being tested in 150 remote villages in

Tanzania that have no schools. A "solar mama" in each village is given a charger, and hands tablets to the children every morning and collects them every evening. The $10m prize will go to the software that most successfully enables children to read, write and do simple maths problems in the absence of a teacher. The data on learning will be collected in March. In the meantime the behaviour of the 3,000 children in the trial is being studied. Emily Church of the XPrize Foundation says they are showing more respect, obedience and confidence, and are "bathing before using the tablets, and dressing as though they were going to school."

Systems such as Mindspark's and onebillion's can also help overcome basic teacher ignorance. Good software, unlike many poor-country teachers, can do its sums correctly, spell, compose a grammatical sentence and offer a wide range of information through videos. Rich-country parents might tut at their children being taught by computers. But if the alternative is an ill-educated teacher, well-designed software may be a better option. Pranav Kothari of Mindspark says ed-tech is much more useful in India than in, say, Singapore: "In India, we need 9m teachers, but we don't have 9m people who can teach."

Tusome's company
But designing the right software gets you only so far. One of the lessons from Tusome is that in order to make a big difference, tech innovations need the acceptance of teachers and administrators. rtiInternational, the American non-profit group that devised Tusome, worked for years within the education system, testing different versions, and even got the approval of the local teachers' union. That is how it got into 23,000 public schools, not the usual handful in a short-lived pilot project.

This year Mindspark is being tried in government schools in the northern Indian state of Rajasthan. At the primary school in Ghanghu, a village in a desert landscape where camels nibble loftily at thorn-tree branches, children sit in the "Mindspark lab"—a bare room with tablets on desks around the walls—doing sums, playing learning games and

watching videos. They are not familiar with tech—none reported having been on the internet—but seem to like it. "In every story I learn new words and their meaning," says 12-year-old Chanda. Mohit, 14, reckons, "It's good because the teacher isn't there, so you're not scared of getting the wrong answer." A Mindspark assistant is always present, so the children get on with their work even without teachers. "It's a normal school," says one of the Mindspark staff. "The teachers are there three or four days out of six."

Ravindra Sharma, the head teacher, is enthusiastic. The children like the tablets, the villagers are interested, and Mindspark has made his school more popular. Enrolment at most government schools in Rajasthan is falling, as more and more parents send their children to private schools. But his rolls have increased from 130 to 143 this year. He hopes that Mindspark is there to stay. Since the costs—$15 per child per year—are not enormous, the studies suggest it is effective and the state government seems to be determined to improve learning outcomes, he may be in luck.

On a shelf above his head, however, sits a *memento mori* for an ed-tech project: a computer monitor still in its box, covered in dust and detritus. Mr Sharma consults his staff about how long it has been there. They think it was part of a government initiative around ten years ago. But memories of the programme, and of what happened to it, have faded into the mists of time.